▶ NETWORKING

AT&T rewrites ISDN specs

BY BOB WALLACE
Senior Writer

Within three months, both AT&T and AT&T Communications, Inc. will release documents containing revisions to AT&T's integrated services digital network primary rate interface specification.

The specification revisions are designed to inform existing and prospective ISDN customer premises equipment vendors of changes in the initial primary rate interface specification.

An AT&T Communications spokesman said the new documents would be available to all its customer premises equipment, as well as to the general public.

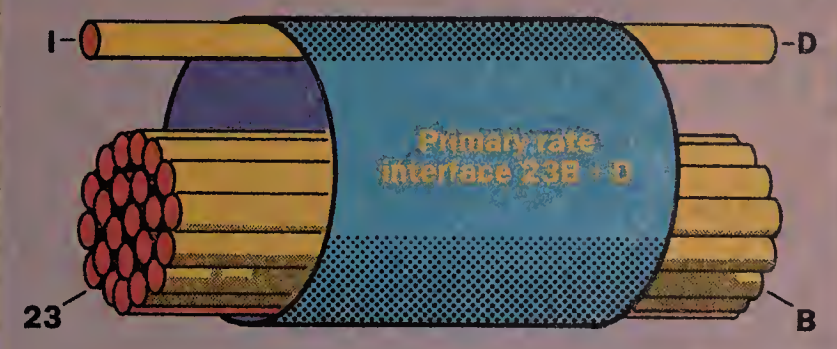
Peter Gagnon, market development manager for AT&T Communications, explained that more than 60 customer premises equipment vendors have already received requests for proposals from customers wondering whether or not their products will be able to support the primary rate interface.

"The purpose of the [AT&T Communications] revision is to provide ISDN customer premises equipment vendors with information that was not mentioned in last year's specification," Gagnon said.

Jumping on the corporate bandwagon,

See **ISDN** page 8

ISDN primary rate interface



Each B channel supports transmission of digitized information at 64K bit/sec.

The D channel supports transmission of signaling information and packet data at 64K bit/sec.

SOURCE: BELL COMMUNICATIONS RESEARCH, INC., LIVINGSTON, N.J.

NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES VOLUME 3, NUMBER 8 APRIL 28, 1986

▶ UPDATE

Once bitten...

Tracking standards.

BY MICHAEL DURR
Special to Network World

The sentiment "once bitten, twice shy" is alive and well among communications system users.

Nowhere is this more apparent than in the area of standards.

Mention the word "standards," and the most amiable person may get ready for battle. Forget explanations; when allegedly compatible systems cannot communicate, users want blood, not excuses. Although all of the problems are not behind us, real standards are emerging. The work of standards organizations — especially the International Standards Organization (ISO) — has begun to bear tangible results. Powerful end-user companies are not only encouraging standards, they are demanding

☞ Continued on **page 31**

▶ PRICING

AT&T hacks long-haul rates

BY JOHN DIX
Senior Editor

WASHINGTON, D.C. — In a dramatic move that may slash costs for many business users and cripple competing carriers, AT&T Communications, Inc. filed for steep across-the-board long-distance rate reductions last week.

The promise of the proposed $1.5-billion rate cuts was tempered somewhat by increased accompanying monthly service fees for Wats and AT&T 800 Service, along with new Wats surcharges.

The rate reductions filed with the Federal Communications Commission for daytime and evening calls include:

- Long-distance service, which was cut 11.4%; cuts were 2.7% for late-night and weekend hours.
- Wats, reduced 12.8%; 5% for late-night and weekend rates.
- 800 service, cut 9.8% and 2% for off-peak usage.
- Megacom Service, slashed 12.5% on average and 3.8% for late night and weekends.
- Megacom 800 Service, cut on average 12.4% and 4.8% off-peak.
- Software-Defined Network Service, which was decreased an average of 10%.

AT&T said the price reductions were made possible by changes in the rates local exchange carriers charge AT&T and other long-haul carri-

See **AT&T** page 8

NETWORK LINE

News

DEC is set to introduce a fiber-optic backbone for 802.3 local nets. Page 2.

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Intel continues to deny that its 80286 chip is the cause of local net lockups. Page 2.

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MCI brings its Vnet virtual network service to the marketplace with a spate of price inducements. Page 4.

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Driven by user demand, Microsoft is enhancing the next version of MS-DOS with such features as LU 6.2 support, multitasking abilities and real-time control. Page 6.

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NEWSPAPER

▶ PRIVATE LINES

Users tromp tariffs

BY MICHAEL FAHEY
Staff Writer

First of a three-part series.

Despite escalating private-line rates, actual line costs can be reduced to pre-AT&T divestiture levels by using optimization techniques that exploit tariff loopholes.

One user contacted by *Network World* claims to be saving a "six-figure" sum of money every month using these little-known techniques.

One such optimization technique involves a configuration option for multidrop data circuits that can reduce monthly costs by 25% to 30%, according to Dave Rubin, vice-president of Contel Business Network's Network

See **Private lines** page 8

▶ 802.3 LOCAL NETS

DEC to unveil fiber link

BY BOB WALLACE
Senior Writer

MARLBOROUGH, Mass. — *Network World* has learned that Digital Equipment Corp. is planning to introduce a networking product that will allow IEEE 802.3-compatible local-area networks produced by any vendor to be connected over fiber-optic cable.

While a source close to DEC last week released the details of the expected product announcement, DEC itself would neither confirm nor deny the existence of the networking product. Steve Windler, OSI products marketing manager for DEC, said he would not speculate on any unannounced product. The IEEE 802.3 standard corresponds to the physical and data link layers of the International Standards Organization's Open Systems Interconnect reference model.

> *"According to the source, the DEC networking product will support data transmission at 100M bit/sec."*

The soon-to-be-announced product reportedly incorporates a portion of the Fiber Distributed Data Interface-Media Access Control (FDDI-MAC) specification that is under development in the Ansi X3T9.5 committee. The evolving specification will support the connection of multiple IEEE 802 local-area networks over a geographic distance of up to 200 kilometers. This local-area network list includes Ethernet-like nets (802.3) as well as token-passing bus (802.4) and token-passing ring (802.5) systems. The specification currently supports data transmission at 100M bit/sec.

According to the source, who declined to be identified, the DEC networking product will support data transmission at 100M bit/sec. The source said the fiber-optic backbone product will allow, for instance, all 802.3-based networks in a 20-story high-rise to communicate with each other.

The use of fiber-optic cable to connect multiple networks is important because fiber is impervious to electromagnetic interference. In a multifloor building, the fiber-optic cable portion of the networking product would probably be run along elevator shafts or in other areas that emit similar interference. The fiber would shield the data in transmis-

See **DEC** page 7

▶ LOCKED-UP LANS

Intel defies user claims

BY MARY PETROSKY
West Coast Correspondent

SANTA CLARA, Calif. — Amid increasing complaints that computers based on its 80286 microprocessor are experiencing crippling lockups [see local nets story, *Network World*, April 14], Intel Corp. has scheduled meetings with multiuser system and local-network server vendors to explore the problem.

Despite the manufacturer's and users' claims to the contrary, Intel has denied that its 80286 chip is the source of the lockups. Instead, the company contends the problem may be due to the design of 80286-based machines.

"We have made contact with these people and are trying to get together with them to look at their systems," said George Alexy, marketing manager for microprocessors at the Santa Clara, Calif., company. "This is a case where there are some design techniques that were not followed."

Computer maker Viasyn Corp., however, maintains the lockup problems result from a bug in the 80286 chip itself. The chip sometimes misinterprets information sent to it by the interrupt controller, said Mark Garetz, vice-president of product marketing at Viasyn. "Both Intel and [Advanced Micro Devices, Inc.] have been informed of the bug, and they have verified our findings," Garetz said.

AMD, a second source for the 80286, last week said it had acknowledged the interrupt problem and would be detailing it — along with a solution — in new documentation. "Our philosophy is to be fairly candid about problems with our devices," said James Williamson, area technical manager for the Sunnyvale, Calif., chip maker. He added that at least one other microcomputer vendor has brought the problem to AMD's attention.

Viasyn has been chasing the 80286 bug since late last year, according to Chairman William Godbout. The company developed hardware fixes and issued several technical bulletins to its distributors in March. The problems first surfaced when Viasyn began shipping the 8-MHz version of its 80286-based Compupro multiuser system.

"Initially we got a trickle of reports that the system gets lost or locks up," said Godbout. "However, as users began to network the systems together, we started getting a spate of reports." The problems tend to be more noticeable in systems with heavy I/O and disk overhead.

One fix involves soldering two wire jumpers on a specific board in order to speed up the interrupt acknowledgment. The latest fix involves replacing a programmable array logic device that changes the timing of the internal bus. "Systems using the CPU 80286 board have the potential for improperly processing an interrupt," stated the most recent technical bulletin. "This is caused by an anomaly on the 80286 chip," it said, adding that it "will not be present in all

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▶ CONNECTIVITY

Users split on proper niche for System/36

BY PAUL KORZENIOWSKI
Senior Writer

Like beauty, the success of the IBM System/36 lies in the eye of the beholder. Some portray the minicomputer as a beauty capable of fulfilling the need for a powerful distributed processing system. Others see it as an ugly duckling that causes more problems than it solves.

The diverging views stem from differing perceptions of the machine's proper market niche, for the minicomputer currently serves two masters. Originally, the System/36 was designed as a replacement for the IBM System/34, a low-end minicomputer. However, in the last few years, IBM has unsuccessfully tried to position the System/36 as its principal office automation offering.

This dichotomy, coupled with perceived software and processing shortcomings, has sparked a great deal of debate concerning the System/36's long-term viability.

International Data Corp. (IDC), a Framingham, Mass., market research firm, reported that 18,000 IBM System/36s were sold in the U.S. last year. That number is roughly double the sales of Digital Equipment Corp.'s Microvax II, the System/36's closest competitor.

Critics claim that most System/36 sales were to smaller companies and that large corporations are shunning the machine. That perception is incorrect, said Richard Mikita, senior research analyst at IDC. Mikita said half of the medium and large corporations surveyed by IDC this fall reported that they work with a hodgepodge of distributed multiuser systems. Of those, the System/36 emerged as the second most popular distributed system, trailing only the IBM Series/1.

McKesson Corp., an Oakland, Calif.-based pharmaceutical conglomerate, is a typical large corporate System/36 user. The company

See **System/36** page 33

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▶ VIRTUAL NETWORKS

Big discounts mark MCI Vnet tariff

BY JOHN DIX
Senior Editor

WASHINGTON, D.C. — MCI Communications Corp. is waiving installation fees and fixed monthly service charges in a promotion designed to attract customers to the Vnet private line network service it tariffed last week.

Customers that sign up for the service before Sept. 1 — the date the tariff is scheduled to go into effect — will not have to pay the normal $5,000 per location installation fee or the $2,500 monthly Vnet service fee for eight months, according to Peggy Knight, senior manager of Vnet development.

MCI introduced Vnet last year in response to AT&T's Software Defined Network service. Two unidentified companies have been testing Vnet.

The promotional maneuvers are necessary because MCI is late in bringing its service to market, according to Page Montgomery, vice-president of Economics and Technology, Inc., a Boston-based firm that researches service and tariff implications.

"I don't know how significant the moves will be because MCI is late tariffing the service relative to other software-defined network services," Montgomery said.

Virtual networks enable users in regional branch offices to be tied into a private corporate network and benefit from, among other things, extension dialing. The circuit is established when needed by the carrier's switches, which house customer-specific, predefined circuit-routing instructions.

Vnet is targeted at dispersed corporations that do at least 20% of their calling between their own offices. Knight said a typical user may have 50 locations. Companies that do not do that much intracompany calling would probably be better off with the typical mix of Wats, MCI Prism and AT&T Megacom services, Knight said.

Customer access to the local Vnet switches, which actually do the call-by-call dialing, is through leased analog or digital facilities. Access through T-1, 1.544M bit/sec digital facilities give the most economical service access. Depending on the mix of traffic and access lines, Vnet can save users 4% to 12% over AT&T's Software Defined Network service. However, that is subject to change if AT&T's pro-

See **MCI** page 33

▶ FIRST QUARTER FINANCIALS

Industry results bullish

BY SHARON SCULLY
Senior Editor

The telecommunications industry and most of its enterprises reported strong financial results for the first three months of 1986, generally indicating positive improvement in sales, earnings and cash flow.

Independent and Bell operating companies showed modest increases in operating revenues and income, despite record-low first-quarter rate increases. According to the Federal Communications Commission's quarterly summary of rate increases, local telephone rates went up $68 million nationwide, the smallest increase on record. The FCC said the telephone companies reported an average increase in revenue and income of about 6%.

Meanwhile, the unregulated new businesses of the regional Bell operating companies and the communications and computer equipment business of AT&T, as expected, showed sales gains. But they also showed negative income and other signs of severe price competition and sluggish markets.

For AT&T, the first quarter of 1986 showed a 50% increase in income, 30% of which analysts attributed to a change in accounting

See **First quarter** page 33

▶ CORPORATE EXPANSION

Nynex buys 81 IBM Product Centers

Firm gains widespread retail presence in most major market centers in the U.S.

BY JIM BROWN
New Products Editor

NEW YORK — Nynex Business Information Systems Co., a subsidiary of Nynex Corp., last week agreed to acquire all of IBM's retail stores in the U.S. Under the agreement, Nynex will purchase 81 IBM Product Centers in 33 states and the District of Columbia and will combine them with 21 of its Northeast-based Datago Business Centers to form Nynex Business Centers.

While continuing the consolidation in computer retailing, the transaction catapults the regional Bell operating company to the number-three position among national nonfranchised computer retailers just one year after the RBOC's entry into the market. The move will give Nynex a retail presence in virtually every major market center in the U.S., and makes the company an authorized dealer of every IBM product currently carried through retail outlets.

Moreover, the move indicates the RBOC has adopted a more aggressive growth-through-acquisition strategy in the mid-sized business user market. Nynex seems to be sharing that strategy with its sister subsidiary, Bell Atlantic Corp, which last year purchased the 60-store CompuShop retail chain, as well as 190 service outlets of Sorbus Service. When finalized July 1, the purchase of IBM's retail business, valued by analysts at about $150 million, will mark the third and largest acquisition by Nynex this year, following two buyouts in the software industry.

The company said it will operate the 81-store retail chain in conjunction with its existing base of DataGo retail stores. Nynex said it will augment the stores' existing IBM product line with other data processing, software and telecommunications products. The company said it would decide the fate of Datago stores that directly compete with IBM Product Centers in seven Northeastern locations. Only Sears, Roebuck & Co. and Businessland, Inc. have larger chains.

The agreement effectively takes IBM out of the U.S. retail marketplace after a five-year presence. IBM will reach noncorporate buyers through its 2,500 authorized dealers nationwide, a network an IBM spokesman said has grown enough to provide adequate market coverage and support for IBM products. Analysts say the product centers were sold because IBM could no longer maintain an increasingly expensive retail operation offering only IBM equipment while authorized dealers were providing the same products and support in stores where customers could choose from a variety of brands.

Nynex has been recently trying to position itself in the voice and data systems market. "We've said from the beginning we wanted to be a national leader in the information industry," a Nynex spokesman said. "What we're striving toward is integration: a total communications system for a small office."

"This gives [Nynex] a huge chunk of the market," said Sid Hoosein, project manager with the Eastern Management Group.

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"ABC membership applied for"

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▶ BUYING SYSTEMS

Small vendors risky?

BY MARGIE SEMILOF
Senior Writer

Buying communications equipment from a small or little-known vendor may be too risky, managers say. But if a user has special needs or a unique application, an innovative product from a small or specialized vendor may be a more appropriate selection.

Users cite the comfort of name recognition as one reason they're more likely to buy from established vendors. Miles Boutelle, director of communications for Allied Stores, said he buys from well-known companies, unless the product is used in noncritical applications.

"We usually hesitate to buy from small start-up companies," Boutelle said. "The retailing industry has historically been on the conservative side. A smaller vendor may have a good product, but we still look for the logo of a major vendor."

The Auburndale, Mass.-based retailer purchased a number of inexpensive, non-brand name personal computers for Allied employees' occasional home use.

"We didn't choose a noted personal computer manufacturer," Boutelle said of the equipment purchase. "But if the manufacturer goes out of business, we do not sustain a big loss."

Boutelle said service reliability was also a consideration when choosing a large vendor.

"In some cases, we lease network equipment, rather than risk having a smaller vendor go under," he said. "This way we do not have to worry about losing maintenance or support."

Some argue that a smaller vendor may be more responsive to a user's service needs. James Morgan, principal consultant with the Morristown, N.J.-based J.H. Morgan Consulting, said users may get better service from smaller vendors if the vendor is located near the user's site. However, he cautioned that smaller maintenance crews may mean spotty service in other parts of the country.

But Morgan said the majority of users are confident that established sellers will be in business in future years, and they believe buying from a large vendor minimizes the chances of being stuck with an unsupported product.

Historically, though, the size of a company has not always dictated the success of its products.

"A user can play it safe and buy from AT&T or IBM," Morgan said. "But company size does not guarantee that vendor will stick with a particular product. ITT Corp. backed out of its central office switch development efforts. Even a big company like that can move out of a marketplace."

Despite the possibility of a large vendor giving up on a market, John McQuillan, president of McQuillan Consulting, Inc., a Cambridge, Mass.-based firm, said most large users remain loyal to established and familiar companies. They consider it more important to avoid a mistake than to take a chance on a product with special capabilities from a lesser known vendor.

"In most situations, there's nothing a new, smaller company can offer now that a good, larger company will not offer later," McQuillan said.

McQuillan said he would consider recommending a small or lesser known vendor's product if it boasted unusual functionality or if the user had a one-of-a-kind application.

Morgan said that users should evaluate what constitutes a small or little-known company.

"A few years ago, there were six T-1 multiplexer manufacturers. Now there are over 50. You know they will not all succeed," Morgan said. "Users should remember that, while some of the better companies are small, they are owned or backed by larger companies."

"Company size does not always determine who makes the best product," he added. "Little companies are formed by entrepreneurs who are usually clever and highly motivated people. They tend to be less bureaucratic. Some of those newcomers will come on strong and outperform the large vendors."

Morgan offered some safeguards for users considering buying from a lesser known vendor.

- Check the financial assets of the company. Find out how many systems are in the field. Also, telephone users and ask if they are satisfied with the service.
- Check who the principals are in an unproven company. They may have a proven track record of success.
- Once the vendor has been selected, make contract provisions that will cushion the blow if the vendor fails. Add a clause claiming purchaser rights to all manufacturing drawings so a third party can manufacture parts if necessary.

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▶ OPERATING SYSTEMS

Microsoft adding LU 6.2, multitasking to MS-DOS

BY MARY PETROSKY
West Coast Correspondent

SAN FRANCISCO — User demand for improved communications capabilities has led Microsoft Corp. to work toward incorporating a variety of communications-related enhancements in the next version of its industry-standard MS-DOS microcomputer operating system, the company said last week.

At a Microsoft-sponsored seminar here for corporate micro users, company officials said the upcoming release of MS-DOS will boast features such as multitasking capabilities, real-time control and IBM LU 6.2 support — all of which are aimed at simplifying communications. The next release is due out for developers by year end and is slated for general availability shortly thereafter. Company officials have not announced the version number of the release.

"Demand for better communications capabilities has been a greater driving force behind new features in DOS than any other," said Scott Treseder, customer marketing manager of systems software for Microsoft.

Treseder said multitasking capabilities will allow users to perform communications tasks, including network-related functions, in the background. Real-time control will help smooth micro-to-mainframe communications, where timing protocols need to be precisely controlled, he added.

Microsoft will likely support IBM's LU 6.2 peer-to-peer communications vehicle through a separate applications program, rather than within the operating system itself, Treseder said. Microsoft will expand MS-DOS to support communications protocols beyond the asynchronous communications now supported.

In addition, the Redmond, Wash.-based software developer plans to break MS-DOS's 640K-byte memory barrier by exploiting the 80286 microprocessor's protected mode. Currently, MS-DOS allows micro users to access only 640K bytes of random-access memory. Protected mode provides for capabilities such as direct addressing of 16M bytes of random-access memory and protection in hardware for software running in multiuser or multitasking environments. Officials indicated that Microsoft would allow users access to the full 16M bytes of memory.

Use of the protected mode will also help Microsoft improve data security and data integrity, Treseder said. Currently, savvy users in a network environment can get around existing controls and gain unauthorized access to files and devices on the network. But while making DOS work in the 80286's protected mode offers a number of advantages, it also spells a loss of compatibility with some existing applications programs, he said.

Chairman Bill Gates told attendees at the seminar that the ability to address the protected mode is a major project at Microsoft. "It will allow applications to work together, but protect them from each other," he said.

Gates said networks operating at speeds between 5M bit/sec and 10M bit/sec will grow in popularity because they allow the use of inexpensive diskless workstations.

Microsoft has an Ethernet network at its new corporate headquarters that supports more than 500 attached nodes.

When questioned about user complaints regarding the IBM PC Network Program's poor network performance, Treseder acknowledged that IBM had modified Microsoft's MS-Net. In its version of the network operating software, IBM allows IBM Personal Computers to operate as file servers and workstations simultaneously. However, MS-Net is designed to be used with a dedicated server, Treseder said.

MS-DOS will bear a close resemblance to traditional minicomputer operating systems, such as Digital Equipment Corp.'s VMS, officials said. The move to add minicomputer-like functionality to MS-DOS will enable the operating system to address the power of Intel's newest microprocessor, the 32-bit 80386. Later this year, Microsoft will offer a version of Xenix that supports the 80386's demand paging feature. Treseder said he expects the 80386 machines to begin entering the market by the end of the year. Microsoft is continuing to position Xenix as its multiuser operating system. Treseder stressed that MS-DOS would never be a multiuser operating system. Future versions of Xenix will continue to follow AT&T's System V standard and will contain hooks into public information services, as well as support for electronic mail.

Microsoft urged corporate users to move toward 80286- and 80386-based microcomputers because 8088-based systems would not be able to support the operating systems' new features.

▶ ROBOTS 10

Robot vendors say MAP key to industry's future

Users, vendors agree MAP will bring facile robot control to manufacturer.

BY BOB WALLACE
Senior Writer

CHICAGO — At last week's Robots 10 exposition here, the nation's leading robotic equipment vendors spoke out on the Manufacturing Automation Protocol (MAP), saying the emerging factory standards hold the key to the future of industry.

Five robot suppliers participating in the show said they currently offer, or will introduce by mid-summer, devices that allow their robots to connect to MAP networks. The vendors included IBM, Asea Robotics, Inc., GMF Robotics Corp., Cincinnati Milacron Marketing Co. and Kuka Welding Systems and Robot Corp. MAP is a set of emerging and established standards designed to allow dissimilar factory gear to communicate over a common network.

Users and vendors alike claimed MAP promises to shift control of shop floor equipment, such as robots, away from the shop floor. A MAP network would allow robot control tasks to be performed at the factory's data center, rather than on the factory floor. Moving robot control from the manufacturing cell to the data center would also enable factory staff to manage robot failures better.

In such a setup, the data center's mainframe could act as a central repository — or library — for the software used to operate the robots [See "Net by Ford," *Network World* Factory Section, April 21]. In a sophisticated MAP environment, a single factory worker could monitor, manage and control the activities of all a factory's robots.

Although MAP holds much promise for robot vendors and factory network designers alike, the majority of robots today operate as stand-alone devices not connected to any type of network. The majority of robots in use today are tied to cell controllers via RS-232 serial links. Cell controllers are processing devices that manage the operation of factory devices performing similar functions.

Richard Johnson, product and market planning manager for GMF Robotics, said the company offers a MAP connection scheme for its robots consisting of a set of three interface boards. "Although MAP is the wave of the future, the RS-232 connection between robots and cell controllers is the hard, cold reality of factory communications today."

Bertil Thorvaldsson, product development manager for Asea Robotics, said the company currently offers an interface that ties robots directly to broadband cable-based,

See **Robots** page 35

▶ VENTURE CAPITAL

$40 million fund revealed

BY NADINE WANDZILAK
Staff Writer

Accel Telecom L.P., a new $40 million venture fund devoted solely to investments in telecommunications companies, has been formed by the national venture capital firm of Accel Partners.

Officials of the venture capital fund said they will be evaluating investments in companies that offer local- and wide-area networks, network management products, information transfer software, T-1 networks, transaction processing applications, enhanced office systems and technologies, switches and test equipment.

Arthur C. Patterson, one of Accel Telecom's three managing partners, said that the group is considering start-ups as well as existing companies for receipt of the funding.

Current investors in Accel Telecom include US West, Inc., Northern Telecom, Inc., Hasler Ltd., the pension funds of AT&T, Bell Atlantic Corp., GTE Service Corp. and such blue chip companies as Citycorp and Manufacturers Hanover. Officials say funding has been completed for Accel Telecom. The fund has already invested in three companies.

According to Accel Managing Partner Dixon Doll, AT&T divestiture and the deregulation of customer premises products and common carrier services, have led to an environment of explosive growth.

Accel expects that the market will represent $150 billion to $200 billion within the next decade, said Doll, founder and chairman of the DMW Group, an Ann Arbor, Mich.-based communications consulting firm.

▶ SHARED SERVICES

IBM wins services contract

MCLEAN, Va. — Realcom Communications Corp., IBM's entry into the shared tenant services arena, last week landed the largest single contract ever awarded by a developer.

Chicago-based Metropolitan Structures has awarded Realcom a contract to supply services for seven Chicago buildings and one Los Angeles building. Ameritech Communications, Inc., a subsidiary of Ameritech, will supply Realcom with the communications equipment and services.

DEC from **page 2**
sion from the interference.

"By using a high-speed distributed data interface like FDDI-MAC, users will be able to interconnect medium-speed networks operating at [10M bit/sec], while providing solid data throughput rates between the different segments of cable," the source explained.

If the communications user ties each network into the fiber-optic data interface, the numerous nets connected to the backbone become generic nets as far as network-to-network data conversion is concerned, the source claimed.

The source added that communications users that combine DEC's local-area network Bridge 100 with the soon-to-be-announced networking product will be able to make the most efficient use of the interface's 100M bit/sec bandwidth.

Correction

In the March 31 issue of *Network World,* legends on the fiber-optic systems map for Norlight and RCI Corp. were inadvertently reversed.

RCI's fiber network connects Buffalo, N.Y., with Chicago and also serves Cleveland and Toledo, Ohio, and South Bend, Ind. The fiber-optics map was provided by Kessler Marketing Intelligence of Newport, R.I.

80286 from **page 2**
systems."

AMD's Williamson said the interrupt problems result from "a misunderstanding of how the [chip] operates internally." He said the problem would be more intense in a network environment, but that, overall, it is statistically a very low probability.

Washington, D.C.-based consultant Frank Dzubeck, president of Communications Network Architecture, Inc., said several of his corporate clients have had hang-up problems and have lost data due to the mishandling of interrupts by 80286-based computers. The Intel chip can't process a high rate of interrupts — a condition often found when an 80286 machine acts as a file server, he said.

The problem is elusive, however. "It depends upon your usage of the machine," Dzubeck said. "This is a stochastic event; it's not predictable using the laws of probability."

Personalized Programming, a Compupro user, had major problems with system hang-up before Viasyn's fixes became available, said Mickey Singer, president of the Alachua, Fla., software development firm. Singer said the company has three Compupro systems networked together. The problem began when the company upgraded its Compupro systems to the 8-MHz version of the 80286. It occurred most often when users were already running several processes and the system attempted to allocate memory for an additional process.

"What do you do with a system that hangs up once or twice a week?" Singer asked. "It's a disaster to have this happen."

Personalized Programming, a medical software vendor, tests a variety of 80286-based microcomputers running Digital Research, Inc.'s Concurrent DOS multiuser operating system. Singer has not seen the hangup problem on other 80286-based microcomputers his company has tested. However, he said he has been told by several computer vendors that the 80286 is a sensitive chip, which may not tolerate operating at fast speeds.

Compaq Computer Corp. says some of its users have encountered the problem when its Deskpro 80286 is used with 3Com Corp.'s Ethernet network. Although Compaq has developed an erasable programmable read-only memory chip that fixes the problem, the Houston-based company is currently working with 3Com to develop another solution.

Williamson said users experiencing a lockup problem should take their computers into their computer retailer or distributor to have it fixed. Compaq's spokesman agreed with this.

▶ UNIONS

CWA moves will impact users little

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — While the Communications Workers of America (CWA) have threatened to strike AT&T, contract negotiations scheduled to resume this week are expected to have little impact on users.

The CWA will hear AT&T's labor contract recommendations this week, and the union is expecting a two-tier wage proposal, CWA President Morton Bahr said at last week's CWA annual convention here. That issue alone could prompt a strike, Bahr warned. "We're not expecting a strike," he said. "But if we have to, we could shut AT&T down."

AT&T's expected two-tier wage scheme would allow a new employee to be paid less than one currently on the job. Fritz Ringling, telecommunications analyst with Gartner Group, Inc., and other analysts believe that AT&T will win the two-tier wage debate and will in turn agree to retrain younger workers for other careers.

"I don't think there will be a strike. It's a lot of tough talk," said Ringling.

"The CWA doesn't have that much bargaining power, and AT&T is not all that vulnerable. In fact, a strike might even help AT&T, which has excess inventory. A strike would halt manufacturing and help reduce the backlog. A strike would also delay installations, but it would not seriously impact basic telephone service," he said.

"The CWA will have to get used to living within the means of a deregulated industry. It has to realize that the companies cannot pass increased costs on to the ratepayer because customers can take their business elsewhere," Ringling said.

At last week's CWA convention, Bahr announced a national advertising campaign that will coincide with AT&T and Bell operating company contract negotiations. The CWA, which represents 155,104 AT&T workers and 300,000 BOC employees, is targeting the campaign not only at corporate management but telecommunications customers as well, hoping to win support from those who might have to foot the bill for salary increases.

AT&T began negotiations with the CWA and the International Brotherhood of Electrical Workers (Ibew) on April 2. The Ibew represents 50,000 AT&T workers. AT&T union contracts expire May 31. Negotiations with the BOCs are not expected to start until bargaining with AT&T is concluded. The unions must negotiate with the BOCs on an individual basis — a move that further dilutes the unions' bargaining stance, Ringling said.

Bahr said job security is the CWA's top priority as the industry adjusts to deregulation and competition. The CWA is also asking the telephone companies to find new jobs and retrain workers when their jobs are phased out. The union also wants employers to end the use of outside contractors, to provide wage increases above the cost of living index and improve health care benefits.

"AT&T has performed well since divestiture," said Bahr. In 1985, AT&T earned $1.6 billion. In the first quarter of this year, AT&T reported net profits nearly 50% higher than the same period last year. "Is this a company that needs concessions from its workers or a company that should lay off workers?" Bahr asked.

AT&T Vice-President of Labor Relations Raymond Williams was recently quoted as saying that if AT&T raises prices to cover pay increases, "we will lose business." Bahr called the statement "pre-negotiation posturing."

Bahr said, "Labor should not have to pay the cost of bad management decisions. AT&T is top-heavy with managers and needs to trim down. The number of supervisors at AT&T far exceeds those at IBM and Northern Telecom, [Inc.] for example," he said.

The telephone companies have been facing increasing pressure to cut prices and keep labor costs down. Last year AT&T laid off 24,000 workers and the union was helpless to respond.

▶ RBOCS

Bolger lauds '85 results

Bell Atlantic CEO cites diversity.

BY KARYL SCOTT
Washington, D.C. Correspondent

PHILADELPHIA — Bell Atlantic Corp. Chairman and Chief Executive Officer Thomas E. Bolger told shareowners at last week's annual meeting that the Bell operating company achieved strong financial results in 1985 through improvements to its core telephone business and diversification into new, unregulated businesses.

Bell Atlantic reported net income of nearly $290 million for the first quarter of 1986, up $34.6 million, or 13.6%, compared with the same quarter last year. Net income for 1985 was $1.093 billion, a 12.3% increase over the $973 million reported for 1984.

The Bell operating company said its first quarter revenue was $2.36 billion, up some $242 million from the year earlier period. For all of 1985, Bell Atlantic reported $9.084 billion in revenue, compared to $8.09 billion for 1984.

In March, Bell Atlantic also announced a 2-for-1 stock split and increased its quarterly dividend. Earnings per share based on 200 million average shares outstanding were $1.45, an increase of 17 cents per share on a post-split basis.

The nearly $1 billion increase in 1985 operating revenue was "partly attributable to strong growth in our telephone access lines and usage and partly to a substantial increase in the operating revenues of our Enterprises' Companies, which jumped from $46 million in 1984 to $427 million in 1985," Bolger said.

Bell Atlantic's Enterprises' organization includes Sorbus, a computer service firm, MAI Canada, Ltd., which markets and services mini- and microcomputers and custom application software in Canada, CompuShop computer stores, Bell Atlanticom Systems, Inc., a provider of customer premises equipment, and Bell Atlantic Mobile Systems, which sells and services cellular mobile telephone equipment in the Mid-Atlantic states. Also included in the Enterprises' family are A Beeper Company Associates, a paging equipment and service firm, TriContinental Leasing Corp., a national leasing company, and Bell Atlantic Properties, which provides real estate services to the other Enterprises' companies.

At a press conference prior to the annual meeting, Bolger claimed that having the lowest cost telephone operations in the business and being in a region with a growing, service-oriented economy also contributed to Bell Atlantic's suc-

See **Bell** page 34

INDUSTRY UPDATE

Japan's three largest trading houses — Mitsubishi Corp., Mitsui & Co. and Sumitomo Corp. — last week announced plans to establish a jointly run international communications service. The trio will go head-to-head with Kokusai Denshin-Denwa Co. (KDD), which holds the monopoly on Japanese overseas telecommunications.

Preliminary plans call for the group to lease as many as five transponders on Intelsat satellites and to rely on existing undersea cables between the U.S. and Japan. The trio hopes to provide international telephone and facsimile communications, teleconferencing and business data transmission, at a rate 20% to 30% lower than that charged by the KDD, said a Mitsubishi official.

CW Communications, Inc.'s International News Service

JOINT VENTURES

No deal on EWSD

Siemens, US West ink central office pact for KN4100.

BY SHARON SCULLY
Senior Editor

BOCA RATON, Fla. — Siemens Information Systems, Inc., a unit of the $22-billion Munich, West Germany-based conglomerate, recently announced it will pursue military telecommunications equipment business in the U.S. through a joint marketing agreement with US West Information Systems of Englewood, Colo.

The agreement calls for the companies to cooperatively market to U.S. military organizations the Siemens KN4100, a distributed processing central office exchange system. Contrary to published trade reports, the agreement does not cover joint marketing of the Siemens EWSD central office exchange, which is sold by a separate subsidiary, Siemens Communications Systems of Boca Raton, Fla.

The KN4100 system is now operating a private network for the U.S. Armed Forces in Europe. The system has been provided exclusively through the West German Deutsche Bundespost, the government-owned telecommunications operator. Known as the Autovon, the Armed Forces private network is scheduled to tie together all Armed Forces locations in West Germany, the Netherlands, Italy and Belgium, at a cost estimated by Siemens to be around $150 million.

Siemens and US West Information Systems will jointly pursue equipment deals for Autovon network sites located in the U.S. — as well as what Frank J. Derfler, acquisition policy chief for the U.S. Defense Communications Agency, described as "base level modifications and replacements" to existing domestic Department of Defense networks.

Lois Leach, a spokesman for US West Information Systems, said the agreement is exclusive, meaning the companies would not pursue military telecommunications business directly or in conjunction with another supplier. But Bob Hanson, director of sales for Siemens, said his company "may elect other options."

Hanson said Siemens has not signed any kind of exclusive agreement. He added, "Although the company's position is to work through distribution channels in the U.S., that is not to say that the distribution strategy is not subject to change."

"To a large extent, it is the will of the customer," Hanson said.

See **EWSD** page 10

VENDOR VIEW

MARK DAVIES

Computer III: threat or wellspring?

In August 1985, the Federal Communications Commission initiated the Third Computer Inquiry. Next month we are likely to hear the FCC's proposal, which could represent both a threat and an opportunity to the communications industry. Instigated only two years after the Bell System breakup, Computer III will result in a new set of FCC regulations for the industry to grapple with — regulations with far-reaching impact.

The foremost decision revolves around whether the Bell operating companies can sell enhanced services side by side with their basic services through one marketing organization, instead of through separate subsidiaries. In a related decision in December, AT&T was granted this right. Both the BOCs and AT&T claim that selling through separate subsidiaries imposes unnecessary costs. Other FCC proceedings also raised the fundamental issue of whether these same organizations can sell equipment in conjunction with services.

At the outset, Computer III had two basic goals affecting enhanced services: to develop an entirely new regulatory framework to replace the "basic" or "enhanced" service definitions, and to eliminate the structural separation requirement.

It is significant that the FCC's proposed framework is based on the market power of the carrier offering the enhanced services, instead of the applied service definition. This framework retains basic regulated service and proposes regulation for enhanced services — but only if they are offered by a dominant carrier in noncompetitive markets or where the carrier controls so-called bottlenecks.

On this one issue, industry reaction has been united: There is no question that the proposed framework is unwieldy. If the FCC forges ahead with the framework, the courts will be called on to determine which are competitive markets and where bottlenecks exist. As a result, new services may be indefinitely delayed.

As part of Computer III, the FCC is considering abolishing structural separation and has asked for comment on regulatory safeguards. No serious attempt has been made by the FCC to compare the costs of structural separation with alternative solutions.

Alternative safeguards greatly increase not only the scope but the cost of regulation by requiring the FCC to monitor both regulated and unregulated activities of the carriers. This has major financial and resource implications. If the FCC abdicates its responsibility, the burden of this oversight will simply shift to the courts.

The task of enforcing safeguards is so large that abuse is almost inevitable. Carriers can shift costs from their unregulated business to their regulated

See **Computer III** page 10

CONTRACTS

MALVERN, Pa. — **Rabbit Software Corp.** last week announced an agreement that allows **IBM** to market under its logo the Rabbit 3270-Plus micro-to-mainframe link for the IBM Personal Computer AT. Separately, Rabbit Software announced a five-year agreement to supply several of its software products to **Tolerant Systems Corp.** of San Jose, Calif., for use with Tolerant's Eternity Series fault-tolerant on-line transaction processing systems.

Under the terms of the agreement, IBM will market the 3270-Plus distributed-processing system package under the name Interactive Executive 3270-Plus. The package provides IBM 3270 network communications under IBM's Systems Network Architecture. It also allows the IBM Personal Computer AT to retain its processing power while emulating an intelligent IBM 3270 workstation, in order to access and use data in IBM 3270 networks.

The terms of the agreement were not disclosed.

Rabbit Software agreed to supply to Tolerant its IBM-compatible software, including Peer-to-Peer Plus, which implements IBM's LU 6.2/PU 2.1 Advanced Program-to-Program Communications protocol and 3270-Plus.

Also, Rabbit Software will supply Tolerant Systems with its RJE-Plus package, which emulates IBM's remote job entry hardware, and its Spooler-Plus package for multiuser, multiprinter applications.

Rabbit Software said it expects more than $3 million in sales from the agreement with Tolerant Systems.

WEST CALDWELL, N.J. — **Ricoh Corp.** signed a contract to supply image scanners to **AT&T Information Systems** for use in AT&T's image processing systems. The scanner reads standard-size documents, graphics, hand-written material and photos into the image processing system using AT&T's 6300 personal computer.

MILPITAS, Calif. — **Octel Communications Corp.** announced that its Aspen and Aspen Branch voice message systems will be sold as part of **PacTel Communications Systems'** voice/data product line. PacTel plans to market the products to California customers, in conjunction with **Northern Telecom, Inc.'s** Meridian SL-1 Integrated Services Network.

Octel officials say the agreement will help the firm gain a wider market share in its home state.

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According to Hanson, the KN4100 system was originally designed by Siemens for the U.S. Armed Forces prior to 1981.

At that time, a consortium of three central office exchange vendors — including Siemens, Standard Elektrik Lorenz (SEL), a German subsidiary of ITT Corp., and Telenorma, an Italian manufacturer — was formed with Siemens at the head. In order to secure rights to operate a network outside of the Deutsche Bundespost public switched network, the U.S. Armed Forces chose to operate its private network with Siemens KN4100 exchanges it would purchase from the Bundespost, rather than directly from Siemens. Siemens, SEL and Telenorma then were awarded contracts to install and maintain the Autovon network.

In a prepared statement, H.W. Krause, president of Siemens Information Systems, said, "Even before divestiture, the phone companies now owned by US West were extremely active in government business." He added, "demonstrated commitment to and special knowledge of the complex government market is critical to the success of this project."

US West Information Systems was formed in October, with the merger of two unregulated subsidiaries of the Denver-based regional Bell operating company, US West. The subsidiaries were FirsTel Information Systems, the customer premises equipment marketing unit, and Interline Communication Services, Omaha, Neb. FirsTel and later US West Information Systems were successful in securing U.S. General Services Administration (GSA) contract awards for the replacement of station equipment and private branch exchanges in seven of 10 government regions.

Although a US West spokeswoman said last week the first GSA award the company secured — Region 3, covering New York — was awarded to FirsTel, a press release put out by Interline in 1984 claimed the contract award. Interline at that time was the center of controversy surrounding its charter, and charges from independent equipment dealers were that it was undercutting competition by packaging regulated telephone company services and unregulated customer premises equipment.

The first GSA contract claimed by Interline in 1984 was said by the company to have been for consulting services, including the recommendation of certain equipment and the installation and maintenance of that equipment. All the equipment bought by the GSA was secured from FirsTel, Interline's sister subsidiary.

According to Modified Final Judgment restrictions governing its divestiture from the Bell System, Interline, as an unregulated subsidiary, could not jointly market equipment and telephone network services.

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base. Consumers may see higher rates as carriers pass on the costs of risky new ventures, aggressive pricing of new services and new capital expenditures. The unregulated businesses can benefit from advance marketing and technical knowledge of the carrier offerings. Competition could also suffer, since customers who order all types of services from one carrier might get service more quickly than those who go to other companies, such as MCI Communicatons Corp. or Tymnet, Inc., for enhanced services. Or the carrier could offer better lines, particularly critical in data transmission, to customers who also buy their equipment in conjunction with the service.

Computer III may also permit BOCs to sell network channel terminating equipment (NCTE) as part of the network instead of selling it through a separate subsidiary. NCTE refers to a particular category of customer premises equipment that links directly to the network.

The implications are increased cost and less end-user control over the network. In isolating NCTE as a network capability, separate equipment for other customer premises equipment could be required, forcing customers to buy separate data service units and channel service units (CSU).

No longer could an integrated CSU be substituted in case of failure. And no longer could the customer's network management system be used to monitor NCTE. Any failure in the NCTE must also be fixed by the carrier.

Without waiting long enough to learn whether true competition among the BOCs was possible, this Third Computer Inquiry may be premature. While not perfect, the waiver processes under Computer III appear to offer a workable solution, although the BOCs complain this is burdensome.

Computer III will require all industry players to expend considerable time and resources. And the adopted safeguards may not be much less costly to implement.

Davies is vice-president, marketing, for Codex Corp., Mansfield, Mass.

TELECOM TRENDS

AT&T upgrades switching facilities

AT&T has upgraded nine more of its switching facilities with Dynamic Nonhierarchical Routing (DNHR), an automatic call-routing system. DNHR minimizes network call-blocking by switching around congested areas, often by routing calls through states in different time zones. AT&T expects to have converted a total of 69 electronic switching offices to DNHR by the end of the year.

▶ CORPORATE MOVES

Dynamic move hits groove

Dynamics Research moves into a new building in only eight months.

BY PAUL KORZENIOWSKI
Senior Writer

ANDOVER, Mass. — William K. Brock, manager of telecommunications at Dynamics Research Corp., had eight months to do what often takes two years.

Within that limited time, Brock planed and implemented communications systems for a new company building, while coordinating services to link that building to Dynamics' headquarters in Wilmington, Mass. Construction approval for the new building came in January 1985, leaving Brock little time to arrange for services and to select equipment by the date of the move, Aug. 5.

Earlier, New England Telephone Co. had verbally promised Brock the installation of a 1.54M bit/sec digital T-1 line between the facilities by the time the company moved in. But, in June, New England Telephone informed him that it could not install the link until later that fall.

Dynamics supplies technical support services, such as project management, to the U.S. Department of Defense. Many of these services are provided from a Honeywell, Inc. DPS/8-70 that the company planned to move from Wilmington to nearby Andover, Mass., where its support team was to be housed.

The T-1 link was needed to route critical Defense Department traffic to the new Honeywell location and

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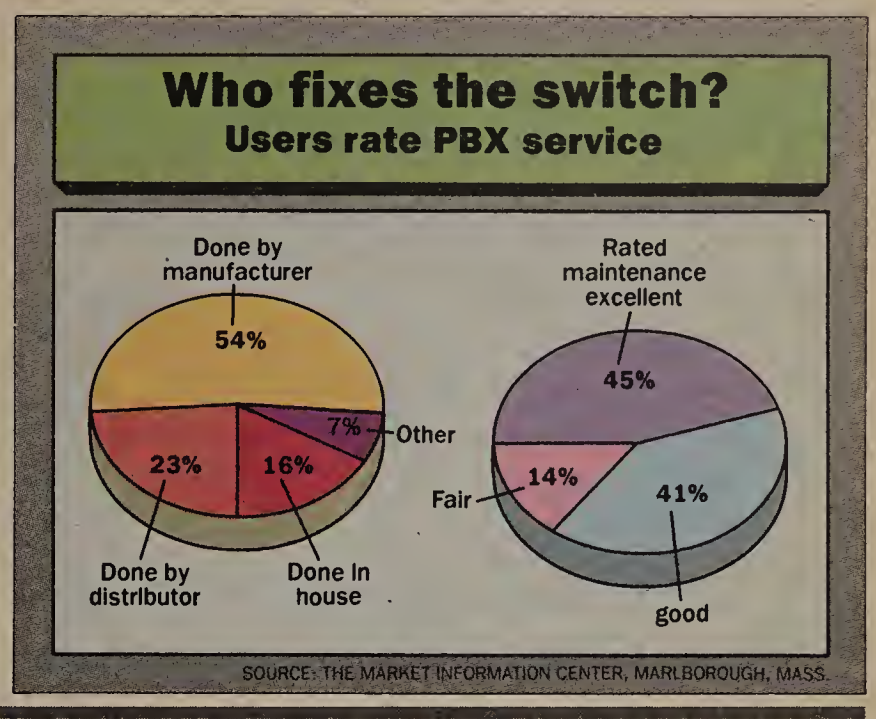

CROSS TALK
JOHN DIX

No terminal connection

A few local network suppliers recently began supporting IBM 3270 terminals, but it is clear IBM does not intend to directly support terminals with its own network scheme.

This is important to keep in mind when considering wiring plans for buildings and network planning.

Network vendors pushing buildingwide local networks typically propose installing a cable, usually coaxial, within reach of each office to be served. Terminal users attached to this cable with a network interface unit and drop wire can communicate with remote hosts through network-attached terminal controllers.

This approach addresses two office concerns: It eliminates cabling nightmares by replacing individual terminal-to-controller cables with a single shared wire; and it enables workstations to be attached to multiple devices, instead of being hardwired to a single resource.

IBM treats these concerns separately. It advocates a wiring scheme, the IBM Cabling System, to provide terminal-to-controller support, and a local network, the IBM Token-Ring Network, to provide resource sharing.

The advantage of the Cabling System over traditional terminal wiring practices is that it is reusable. Once in place, installation or relocation of terminals is achieved by plugging the device into a Cabling System data outlet and making the appropriate patches in the nearest wiring closet. While different in topology, the Cabling System still ties workstations to controllers on a point-to-point basis. To achieve connection flexibility, IBM lays its Token-Ring Network over the Cabling System. This enables workstations to communicate with other network-attached devices.

IBM's approach takes into account the reality of end-user needs, something vendors of the buildingwide common cable approach ignore. Instead of networking all end-user devices, IBM will network primarily intelligent workstations such as the Personal Computer.

Terminals will not typically be supported with the Token Ring, just hardwired to their associated controller using the Cabling System. While limiting, this configuration is in keeping with the typical 3270 user's needs and still affords flexible access to a variety of resources.

Terminal users, for example, can access different hosts and applications today using the routing function of IBM front-end processors. A terminal controller rumored to be under development, the 81C, will extend that capability by offering multiple host links and an interface to the Token-Ring Network.

Providing a network interface at the controller level instead of the terminal level limits the amount of 3270 traffic on the network, an important load consideration.

But perhaps more important, this configuration provides flexible support for traditional 3270 users and reduces the cost of networking for workstations where and when needed.

▶ TOKEN-RING

Repeaters boost net

RYE BROOK, N.Y. — IBM recently extended the reach of its Token-Ring Network with the introduction of net repeaters and a bridge program.

The products were bundled with the announcement of local network support for IBM System/36 and System/370 hosts (*Network World*, April 21).

The network repeaters include the 8218 Copper Repeater and the 8219 Optical-Fiber Repeater. The repeaters allow for greater distances between Token Ring 8228 Multistation Access Units.

The 8228 units act as concentration hubs supporting multiple office connections in a star configuration. They are typically housed in wiring closets.

With the copper repeater, 8228 access units can be separated by up to 750 meters using data-grade shielded twisted-pair wire in the IBM Cabling System, a building wiring scheme. Without repeaters, 8228s must be within 200 feet of each other.

Both the copper and fiber repeaters are typically installed in the same standard 19-in. rack that houses the 8228 access units. Two repeaters are required for each extended link, one for either end. The shelf option for rack mounting can accommodate up to seven 8218 Copper Repeaters.

Repeaters can be installed or removed from the rack-mounting assembly without powering down other repeaters.

The 8219 Optical-Fiber Repeater is installed and used in the same way as the copper version, but ex-

See **IBM** page 14

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Dynamics from **page 11**
to support 16-voice tie lines. To provide continued support to Defense Department customers, who access the system through dial-up or dedicated lines, the Honeywell installation had to remain on line for as long as possible during the transition.

Faced with the dilemma of delaying the move, Brock wrote Gerhard M. Freche, president of New England Telephone and explained Dynamics' predicament. Thanks to Freche, the delay was magically shortened and Dynamics was able to move into its new building almost on schedule. "One other time, we had written a letter to Freche," Brock said. "We had a billing problem and he also quickly straightened out that situation."

The difficulty of the T-1 line connection was one of a series of challenges Dynamics faced. A chief constraint was the short time frame in planning the move. "We could have spent two years planning and making the move," Brock said. "We only had six months."

> *"A chief constraint was the short time frame."*

Along with the T-1 line, the company had to purchase T-1 multiplexers and a private branch exchange for the remote location. "Since we needed the T-1 line from New England Telephone, we decided to buy the multiplexers from it as well," Brock said. Dynamics settled on General Datacomm Industries, Inc. equipment, which is sold by New England Telephone.

For the Andover PBX, the company sent out requests for proposals to eight manufacturers. Six responded and, after a short analysis, the contract was awarded to Telex Corp., which had purchased United Technologies Corp.'s telecommunications division. Dynamics purchased a Lexar Corp. PBX that could support 1,000 lines, of which about 600 are currently in use.

The Lexar offering was chosen for two reasons, Brock said, low price and small size. Dynamics was interested in AT&T switches, but the System 85 was too big and too expensive. "The AT&T offering would have cost twice as much as the Lexar." An AT&T System 75 might have been a better choice, but AT&T could not guarantee that a new model under construction would be shipping when Dynamics moved.

Rolm Corp.'s wares were eliminated early in the process because they would not fit in the computer room. "We would have had to build a new room just for the PBX and we didn't have the extra space," Brock noted. Overall, the move went smoothly. Although the company missed its target date of Aug. 5, it was in its new office less than two weeks later. "We could have taken more time planning," Brock said, "but I'm not sure it would have brought better results."

Today, the telecommunications industry is making advances by leaps and bounds. To help you keep up with it, there's ICA. The International Communications Association—the association of large professional telecommunications users providing comprehensive, up-to-the-minute information and education in the fields of voice, data and image communication. ICA also sponsors one of the largest telecommunications exposition in the world. It's called "Telecom." And this year it's being held in Atlanta, June 2nd thru the 5th, at the Georgia World Congress Center.

At Telecom '86, you'll be able to see new ideas, new applications, new technologies, as well as new ways to upgrade your Telecom systems, through hands-on exposure. All the latest equipment will be on display from vendors, from the U.S. and the world over, in every area of the telecommunications industry.

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INTERNATIONAL COMMUNICATIONS ASSOCIATION

nww

IBM from **page 11**
tends the permissible distance between 8228 Multistation Access Units up to 6,600 feet. It can be used with the fiber in IBM's Type 5 cable in the cabling system or optical fibers of other sizes, including fibers with internal or external diameters of 50/125, 62.5/125 and 85/125 microns.

Both repeater products operate at the standard Token-Ring rate of 4M bit/sec.

The 8218 Copper Repeater costs $1,095 and is scheduled to be available in June. The 8219 Optic-Fiber Repeater costs $1,650 and is available now.

While the repeaters extend the distance of any one Token-Ring Network, the concurrently announced Bridge Program allows individual nets to be hooked together to create a logical network. The network can then support a greater number of devices. Without bridges, the Token Ring can support 260 devices with shielded twisted-pair and 70 devices with nonshielded wire.

The Token-Ring Bridge Program runs on a dedicated IBM Personal Computer AT, which is outfitted with two of the newly released Token-Ring PC Adapter II cards and 256K bytes of memory. PC-DOS 3.2 is also required.

Bridged networks appear as one logical ring. Applications compatible with IBM's Network Basic Input/Output System and its Advanced Program-to-Program Communications, or LU 6.2, can communicate transparently across a bridge.

Token Rings can be bridged in a series, parallel or hierarchical fashion.

"Factors to consider when calculating appropriate ring size and bridge configuration are affinity groups, establishment topology, ring traffic load and ring availability requirements," IBM reported.

The Bridge Program costs $1,495 and is available now.

DATA DELIVERY

"A company could make a strong case of moving to an ISDN network solely on the basis of the added functions and savings from ISDN voice functions.

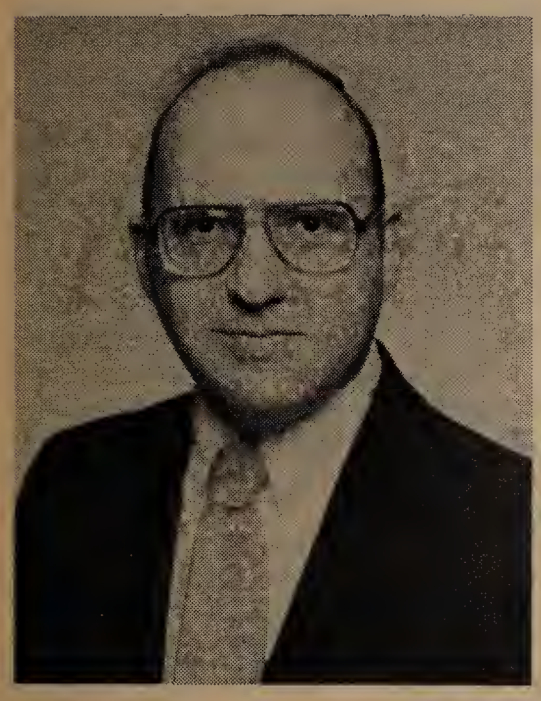
Pat Krause, telecommunications director, McDonalds Corp., Oakbrook, Ill.

At the end of this year, McDonalds, in cooperation with Ameritech, will begin one of the first ISDN field tests.

▶ STANDARDS

A CCITT modem primer

U.S. CCITT modem chairman explains V.32, V.33.



Robert Fenichel

In the past few months, a number of high-speed, dial-up modems that work with trellis-coded modulation have been announced. Recently, Network World *Senior Writer Paul Korzeniowski interviewed Robert Fenichel to gauge the impact of this new breed of modems. Fenichel is chairman of the U.S. Consultative Committee on International Telephony and Telegraphy (CCITT) modem working party. He is also a U.S. delegate to the study group of the CCITT international modem committee. Fenichel works at the U.S. Office of Technology and Standards where he helps to develop federal communications standards.*

How long have the CCITT V.32 standard for 9.6K bit/sec dial-up transmission and the V.33 standard for 14.4K bit/sec leased-line transmission been in development?

V.32 has been in development for about six years and it is an approved CCITT recommendation. Every four years, CCITT holds a plenary assembly and a book of approved recommendations for that four-year period is printed.

The last book was printed in October 1984, and V.32 had been approved then. V.33 has met with preliminary approval through a special accelerated procedure used between plenary assemblies. But it is not yet a fully approved recommendation.

What are the chief benefits of these recent standards?

They are part of the evolutionary process involved in using higher speed data rates over telephone lines. The process began with CCITT recommendation V.22, designed for the two-wire, 1,200 bit/sec, full-duplex modem. Next was CCITT V.22bis, a 2,400 bit/sec full-

See **Fenichel** page 16

DATA DIALOGUE

DONALD H. CZUBEK

A close look at APPC

Currently, IBM's Advanced Program-to-Program Communications (APPC) is garnering a lot of press. APPC consists of two components: Logical Unit Type 6.2 and Physical Unit Type 2.1. Together, they supply peer-to-peer communications among workstations, departmental processors and mainframes.

The term "peer-to-peer communications" is a bit misleading. It implies that communications is limited to one type of product, such as mainframe-to-mainframe or Personal Computer-to-Personal Computer, but this is not always the case. A better name would be hostless communications, because what APPC supplies is the ability to connect devices without a Systems Network Architecture host. A good example of a hostless network would be a group of Personal Computers, each running IBM's APPC/Personal Computer software and working with an IBM System/36 departmental processor.

Despite all the talk about APPC, it is currently very limited. Two factors will determine how well peer-to-peer communications is accepted: application requirements and overcoming current technical limitations.

The migration away from hierarchical toward peer-to-peer applications will be slow. Few off-the-shelf applications are available from IBM — or anyone else — and user-written applications have not yet been designed and implemented.

Most distributed applications now being designed require access to mainframe resources, especially data bases. These applications are better suited to a traditional host-centered, hierarchical SNA network than to peer-to-peer connections.

It's interesting to note that Disoss, the most significant APPC-based application now available, resides on a mainframe and uses hierarchical APPC communications to work with the distributed Personal Services products. Thus, the host still remains the application focal point.

There are some suitable peer-to-peer applications. The IBM System/36 and System/38 use peer-to-peer communications to distribute electronic mail. IBM also has a product called Distributed Data Management, which uses APPC to link file systems on multiple IBM System/36s into a distributed system.

APPC technical limitations can be divided into three categories: configuration management, network diagnostics and networking capability.

SNA network configuration management has always been a challenge to network designers and operations managers. The problem is that a complete network must be statically predefined on the hosts and communications controllers.

Peer-to-peer SNA complicates the matter in two ways. First, connectivity between peer-coupled network components is often more complex than in a hierarchical network because each workstation can be connected to multiple peers. Since each device must be defined to all possible peers, in an absolute peer-to-peer network, every device must be defined to all other devices. This can be a confusing and time-consuming chore.

Another configuration problem is that there is no central configuration management point. Therefore, each set of devices has to be separately configured by its system administrator. Yet all possible configurations must

See **APPC** page 16

IBM INSIGHTS

Speak up. I can't hear you. Earlier this month, Big Blue rolled out an experimental speech-recognition system based on its Personal Computer AT. Although the company did not officially announce any product, it did demonstrate the unit, which reportedly can recognize 5,000 words.

Three expansion boards attach the microcomputer to the speech-recognition system that it works with. IBM plans to test the device internally before deciding what its next step will be.

Filling in another missing piece. The IBM Series/1 was enhanced to support IBM's emerging distributed data processing facilities. Document Content Architecture, Document Interchange Architecture and Systems Network Architecture Distribution Services now are available on the Series/1. The software, which will be available in the first quarter of 1987, runs on a Series/1 with at least 1M byte of random-access memory.

Take my front end, please. In an effort to spur sales of the IBM 3725 front-end processor, Big Blue is offering current IBM 3705 users a 15% discount on IBM 3725 purchases.

The discount will run until October, according to Vince Barrett, vice-president at the Gartner Group, Inc., a Stamford, Conn., market research firm.

PRODUCTS & SERVICES

Controller links IBM micro to Decnet

Micom Systems, Inc. has introduced a controller that links an IBM Personal Computer to Digital Equipment Corp.'s Decnet.

The Micom-Interlan NI5010 Data Link Controller supports transmission speeds up to 10M bit/sec and requires DEC's Decnet-DOS software, according to a vendor spokesman.

The NI5010 comes in two versions: one an on-board transceiver for thin-cable Ethernet, the other a transceiver cable interface connecting with an external transceiver using Ethernet/IEEE 802.3 cables.

Pricing for the on-board transceiver is $650. Pricing for the transceiver cable interface is $550.

Micom Systems, Inc., P.O. Box 8100, Simi Valley, Calif. 93062-8100 (800) 642-6687.

Pathway Design, Inc. announced a micro-to-mainframe link that connects IBM Personal Computers to an IBM System 34, System 36 or System 38 minicomputer.

PcPath 5250 emulates an IBM 5251 Model 12 terminal and operates on dial-up, leased-line or point-to-point lines at speeds up to 96K bit/sec.

The system reportedly supports multiple host sessions, enabling a user to maintain a communications session in the background and use a personal computer application in the foreground.

The system includes a bi-directional file transfer software package developed by Laguna Laboratories, Inc. called Decision-link.

The package is priced at $750.

Pathway Design, Inc., P.O. Box 8179, Natick, Mass. 01760 (617) 237-7722.

A pair of trellis-coded modulation modems that conform to the CCITT's V.33 standard were unveiled by Paradyne Corp.

The modems transmit data in full- or half-duplex mode over four-wire leased lines.

The Challenger V.33/16K, a single-card device, conforms to CCITT V.33 standards for 14.4K or 12K bit/sec transmission with forward error correction. The device transmits at a speed of 16K bit/sec by dropping its trellis coding and forward error-correction features.

The Challenger V.33/16K transmits over D1-conditioned leased lines using either terrestrial or satellite communications links.

The device is priced at $3,750.

The VHS 14.4 V.33 combines Paradyne's Analysis network management system and an optional fully buffered time-division multiplexer with the features of the Challenger V.33/16K. It supports single- and multilevel network architectures.

The optional multiplexer can support six channels, as long as the aggregate speed does not exceed 14.4K bit/sec.

The modem includes diagnostic, test and control capabilities. The diagnostic information can be integrated with the Analysis system so that a user can monitor line parameters, streaming conditions and data terminal equipment leads.

The VHS 14.4 V.33 is base-priced at $7,650.

Paradyne Corp., P.O. Box 1347, 8550 Ulmerton Road, Largo, Fla. 33540 (813) 530-2000.

Simware, Inc. introduced a response-time monitor that works with a microcomputer for asynchronous, X.25 or Systems Network Architecture-based networks.

The SIM/RTM measures response time from host computers by emulating various terminals, including the IBM 3278-2 and Digital Equipment Corp. VT-100.

It can operate as a standalone device or it can be made to resemble an IBM 3270 terminal.

Data collected from the device can reportedly be uploaded to the mainframe, processed with self-contained functions or by separate personal computer packages.

The SIM/RTM is priced at $425.

Simware, Inc., 14 Concourse Gate, Nepean, Ont. K2E 7S6 (613) 727-1779.

APPC from **page 15**

be kept in synch, a situation that quickly becomes unmanageable as the network grows.

Adequate problem determination and diagnostic tools are critical in the operation of any network. The current IBM peer-to-peer communications products have only limited problem determination aids. The powerful diagnostic tools are found, not surprisingly, on the mainframe.

Also, departmental processor diagnostic tools must be used by the local system administrators, who are not likely to be communications experts.

Supports only direct links

The last APPC technical limitation stems from the fact that APPC supports only direct links between adjacent processors. There is no end-to-end routing of data through intermediate network nodes. So there must be a direct physical connection between processors.

Because the number of links required grows geometrically with the size of the network, the cost of these data links becomes a major issue. In order to create end-to-end data paths through intermediate nodes, other technologies, such as SNA Distribution Services, must be used with APPC.

Users are faced with two choices. In the short run, many obstacles can be overcome by configuring hybrid networks that use a hierarchical SNA backbone network to interconnect small clusters of peer-coupled workstations.

This approach minimizes the distributed configuration problems and adds host-based diagnostics and network management.

Or they can wait. In a couple of years, IBM will probably sort out most of the technical problems with peer-coupled SNA.

IBM is working on long-range solutions such as its work on Low Entry Networking (LEN) technology. LEN will add both dynamic reconfiguration and intermediate node-routing capability to SNA Cluster Controller product.

Capabilities, such as LEN, will help to overcome some of APPC's limitations. Peer-to-peer SNA communications is coming, but the evolution will take time — more time than many expect.

Czubek is vice-president of Communications Solutions, Inc., a San Jose, Calif., consulting firm.

Fenichel from **page 15**

duplex modem, which is currently becoming very popular. The next jump in technology was to 9.6K bit/sec with V.32. The same scenario followed with leased-line, four-wire duplex modems.

First, there was the CCITT V.29, which operated at speeds up to 9.6K [bit/sec]. The next jump was to 14.4[K bit/sec] with V.33.

Could you explain the difference between trellis-coded modulation and other techniques?

Basic modulation techniques can be illustrated in a phase and amplitude diagram called a constellation, which resembles X and Y coordinates from high school trigonometry. Every group of bits sent requires phase and amplitude coordinates.

Basically, if two bits groups are sent, two to the second power points are needed to illustrate a constellation.

The receiving modem matches what is sent, as far as amplitude and phase points and also assigns value to the group of bits.

At 9.6K bit/sec, one uses a 16-point constellation with four-bit groups. Trellis coding works with five-bit groups and a 32-point constellation.

The extra points enable the modem to sort and decode information more effectively.

What is echo cancellation?

When transmitting at speeds of 1,200 or 2,400 bit/sec, a two-wire duplex modem splits a band in two. One modem sends on the high end of the band and the other uses the low end. Echo cancelling enables the modem to work with the entire band simultaneously in both directions.

Is error checking a part of these standards?

A subgroup of the modem working party is working on error-correction standards, and the CCITT is also working in this area.

When will this standard be established?

I hope one will be established before the next plenary assembly in 1988.

Do these standards include fallback speeds?

Yes, the V.32 fallback speed is 4.8K bit/sec, and the V.33 has a fallback speed of 12K [bit/sec].

Does the standard include recommendations for the type of transmission, such as synchronous or asynchronous?

The trellis-coded recommendations use synchronous transmission. Presently, neither recommendation includes asynchronous capabilities, although it has been brought up for study.

What does it mean when a vendor claims to be compatible with CCITT standards?

Compatibility implies that a product is one step below meeting a CCITT standard.

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FACTORY COMMUNICATIONS

CAD/CAM mart study

A study released by Frost & Sullivan, Inc. of New York, "CAD/CAM Market in the U.S.," projects that the computer-aided design/computer-aided manufacturing market will grow at 15% per year. The study projects the CAD/CAM systems market will reach $3 billion by year end. It forecasts that, by 1992, the market will rocket to almost $8 billion.

▶ MAP VARIATIONS

MAP fouls DEC

Applications layer of Version 3.0 throws wrench in DEC plans.

BY BOB WALLACE
Senior Writer

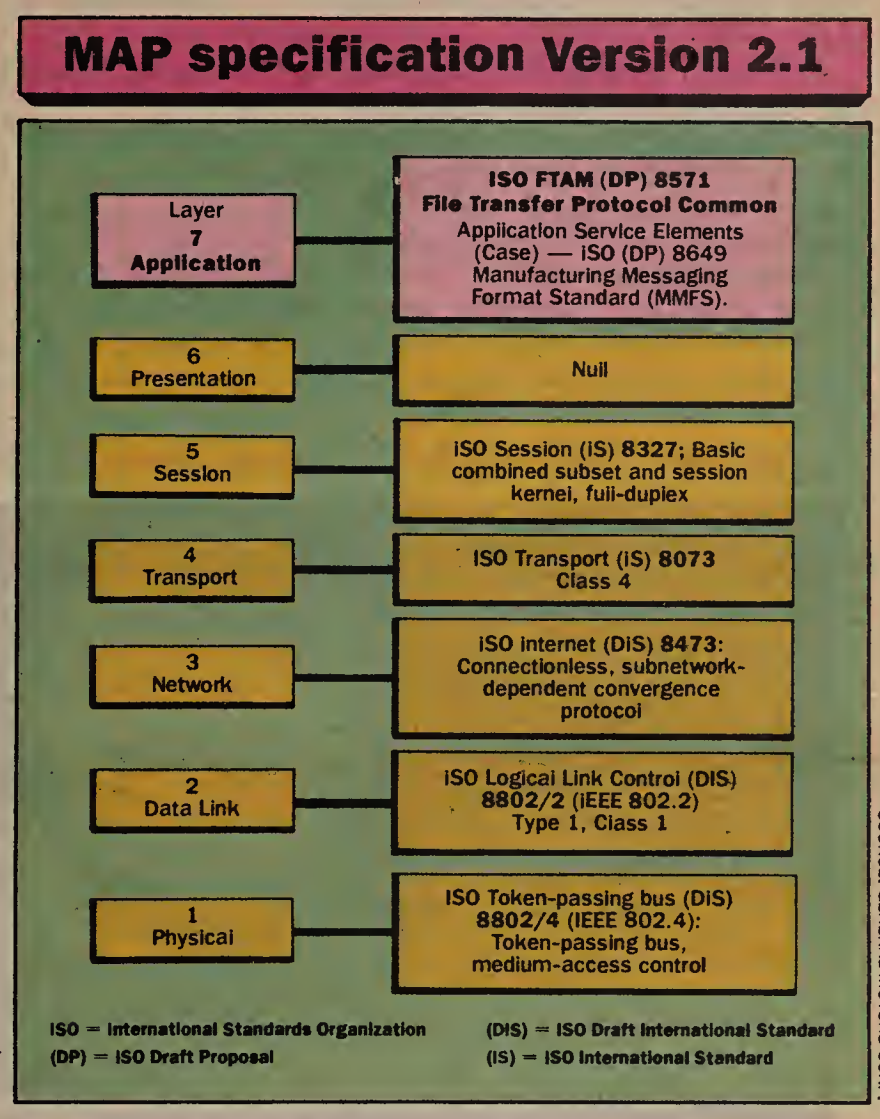
An alteration to the top layer of the Manufacturing Automation Protocol (MAP) specification has caused Digital Equipment Corp. to make drastic changes in the manufacturing of products designed to comply with an upcoming release of the MAP specification.

The applications layer of MAP Version 3.0 will differ from that of the current MAP specification, Version 2.1. The applications layer of the factory communications standard was designed to allow applications programs to communicate with devices such as robots, programmable controllers and computer numerical controllers across a MAP local-area network.

Kevin O'Neill, DEC's manufacturing networks marketing manager, said the File-Transfer Access Method (Ftam) featured in MAP 3.0 — due to be released in March 1987 — may not be compatible with the Ftam in MAP 2.1.

Ftam, one of three Layer 7 applications mechanisms, provides a standard scheme to enable users to transmit files between different MAP systems. The others are the Manufacturing Message Formation Standard (MMFS), often referred to as Memphis, and Common Applications Service Element (Case). Both Ftam and Case are International Standards Organization (ISO) draft international standards. The MMFS

See **MAP** page 18



SOURCE: GENERAL MOTORS CORP.

FACTORY FACTS
BOB WALLACE

Users ponder next move after IBM/Industrial Networking deal

It's too quiet on the Western front. Industrial Networking, Inc. of Santa Clara, Calif., has been keeping a low profile in the fast-paced, factory communications networks marketplace.

Industrial Networking was founded in October 1984 as a joint venture between broadband network vendor Ungermann-Bass, Inc. and General Electric Co. The new company markets the MAP/One system, a local-area network designed to comply with Manufacturing Automation Protocol (MAP) Version 2.1. The broadband, token-passing bus-based industrial network comprises controller boards, a head-end remodulator, a network control console and network software.

Industrial Networking surprised the 600 attendees of the mid-January MAP users group meeting in Toronto by announcing a multimillion dollar joint development agreement with IBM. John Klein, IBM's general manager for manufacturing systems products, said the pact would allow both companies to improve MAP technology.

At the recent International Programmable Controllers show in Detroit, IBM used some Industrial Networking hardware in its three-part factory communications booth. Aside from the Industrial Networking head-end remodulator in IBM's equipment rack at the demonstration, there was little word of the current state of the IBM/Industrial Networking agreement.

Concord Data Systems, Inc. is one of Industrial Networking's prime competitors in the MAP-compatible local-area network market. Concord Data has captured attention in the manufacturing world by signing OEM agreements with Digital Equipment Corp., Honeywell, Inc., Siemens AG, Fairchild Data Corp. and Allen-Bradley Co., though there has been little talk of Industrial Networking installations in manufacturing circles.

Industrial Networking supplies an impressive set of vendors with MAP-compatible networks and components, including General Motors Corp., Electronic Data Systems Corp., Intel Corp., Motorola, Inc., General Electric Co., GMF Robotics, Inc. and Cincinnati Milacron, Inc.

Industrial Networking has made substantial progress in attempting to hook popular equipment to its MAP/One factory net. The system's interface products comprise interfaces that allow host computers based on Motorola's VME bus or Intel's Multibus to connect to a MAP/One net. A third interface allows IBM Personal Computer XTs and ATs to link to the Industrial Networking net. Industrial Networking also provides a general purpose MAP interface that provides the link between a token-passing bus local net and a host system supporting an RS-422 serial channel.

If Industrial Networking sticks with its past approach, expect a major announcement at the MAP/TOP users group meeting in Seattle in mid-May.

INCIDENTALS

Newton-Evans Research Co., of Elliot City, Md., released a study entitled, "Data Communications Usage Trends in Discrete Manufacturing Firms."

The study projects the total number of personal computer modems as 4,503 by the end of 1987. For a copy of the study, contact Karen Dargis at (301) 465-7316.

The Society of Manufacturing Engineers (SME) released a book entitled, "New Directions Through CAD/CAM." The 220-page book provides information on numerous aspects of CAD/CAM, including: the latest technological developments, discussions of CAD/CAM management and justification and suggestions for the future. To obtain a copy of the book, priced at $37, contact SME at (313) 271-1500, ext. 418 or 419.

Frost & Sullivan, Inc., is offering a seminar entitled, "Machover on CAD/CAM," to be held at the Loews Glenpointe Hotel in Teaneck, N.J., June 11-13. Carl Machover is president of Machover Associates Corp., a consulting agency that provides a range of management, engineering, marketing and financial services to computer graphics users, suppliers and investors. For additional information on the seminar, contact Frost & Sullivan at (212) 233-1080.

MAP from **page 17**
protocol was specifically designed for General Motors Corp.

O'Neill said he believed the release of MAP 2.1 in June 1985 was intended to freeze the standard for a few years and to allow vendors to develop equipment compatible with the specification.

"We can't react every two or three months to a change in the specification," he said.

The rapid updating of the factory communications specification has caused DEC a lot of frustration, he said. O'Neill suggested the specification be frozen to allow vendors time to introduce products compatible with MAP 2.1.

The maturing of the MAP specification could also spell trouble for factory networkers who install MAP 2.1 equipment and later want to upgrade their equipment to support the new version of the specification.

> *"Ftam is expected to become a draft international standard."*

It appears that such users will have to grapple with numerous specification incompatibility problems, such as the Ftam issue.

Denise Dezelan, senior systems analyst and a member of GM's advanced engineering staff, explained that compatibility problems between the two Ftam versions are caused by Ftam's progression through the ISO standards-making process. She said all MAP equipment vendors would be affected by the Ftam change. "Vendors have to remember that we have always said the MAP specification specifies emerging and existing standards," she said. "Ftam is currently changing within ISO."

Ftam in MAP 2.1 is a draft proposal within ISO. Ftam is expected to eventually become a draft international standard before becoming a bona fide ISO international standard. "Several aspects of the [Ftam draft proposal] change when it evolves to a full standard," she noted. "By the time the ISO receives all the comments and revisions of the draft from all countries involved, a lot changes."

New version supports five file structures

Tim Boland, a computer scientist with the Gaithersburg, Md.-based National Bureau of Standards, claimed it would not be accurate to say that Ftam in MAP 3.0 is totally incompatible with Ftam in MAP 2.1. But he explained that the new version of Ftam will probably support five file structures, where the old version supported only two.

Boland argued that incompatibility between the Ftams in the two versions of the specification is not an issue. "No one is going to build products based on MAP specification 2.1," Boland said.

He asserted that products based on MAP 2.1 will have a short life because MAP 3.0 is expected to be out in March 1986. Boland said NBS' Ftam special interest group will meet to vote on Ftam for MAP 3.0 within a month.

▶ MARKETING

DEC, ASK, NCA deal

BY NADINE WANDZILAK
Staff Writer

MARLBORO, Mass. — Digital Equipment Corp. has signed systems cooperative marketing program agreements with two software companies, ASK Computer Systems, Inc. and NCA Corp., to jointly market software and systems for Manufacturing Resource Planning (MRP II) applications.

MRP II software combines the functions of MRP I software — which schedules assembly line parts — with financial functions, such as general ledger.

ASK develops, markets and supports manufacturing information software. Its Manman software features integrated modules for manufacturing, engineering, finance and marketing functions. It has been installed in more than 850 manufacturing firms. ASK is headquartered in Los Altos, Calif.

NCA supplies MRP II software that operates on DEC's VAX computers. Its Maxcim package is an integrated 22-module manufacturing, financial and production control system. Maxcim software operates exclusively on all DEC VAX, MicroVAX and VAXcluster systems. The Maxcim package also offers specialized modules, such as R/FLX for flexibility and just-in-time performance in repetitive manufacturing environments. More than 550 Maxcims have been installed. NCA is headquartered in Santa Clara, Calif.

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COMMUNICATIONS MANAGER

"When buying equipment, look at the life of a product as being on a curve. Go with the product that has matured enough to be on the curve's upward growth side, but not too far along the product decline side. You do not want a product that is unproven, but you also do not want something that may be headed for obsolescence.

Jim Morgan
principal consultant
J.H. Morgan Consulting

▶ CONSULTANTS

Hired hands

Make the most of your resources.

BY MARGIE SEMILOF
Senior Writer

Thinking of hiring a consultant? The time and money a qualified consultant can save users by helping them avoid purchasing mistakes and speeding the completion of in-house communications projects may justify the cost of hiring one.

But even consultants warn that making the most of a consultant means managing that person just as any other company resource.

At least that was the message of telecommunications consultants speaking recently before a gathering of Empire Wo/Men in Telecommunications, a New York-based society for telecommunications managers.

According to Francis Callahan, director of Callahan & Co., a New Rochelle, N.Y.-based management and consulting firm, the success of a communications project depends on the interaction between the company and the consultant. He observed that consultants are often hired and shunted off to "find the company's problem" without the complete support and cooperation of management.

"Before the individual is hired, decide what job you want done so you can provide some specific guidelines," Callahan said. "Don't just set the consultant loose in your company."

Callahan said there is often little daily interaction between the hiring executive and the consultant; therefore, regular planned meetings between the two parties are imperative.

Jane Laino, president of Corporate Communications Consultants, Inc., said customers are hiring telecommunications consultants to provide an objective look at communications problems within their companies. Consultants also provide a second opinion on bids the customer may have already obtained from equipment vendors.

"Users only enter major sales agreements every five to 10 years," she said. "But a consultant is familiar with vendors and knows what the vendor sales staff will not tell you."

Users have a number of sources at their disposal for selecting an appropriate consultant. They can call either the New York-based Society of Telecommunications Consultants for telecommunications referrals or the St. Louis, Mo.-based Independent Computer Consulting Association for data communications expertise.

Other options are researching trade magazines for consultant-contributed articles, word-of-mouth recommendations from other users contacted at either trade shows or seminars.

Users are advised to base their final choices on how well each consultant communicates ideas with management and fits into the corporate culture — not the consultant fee.

GUIDELINES

BY ERIC SCHMALL

Do you read?

Reading has become a neglected, if not totally forgotten, task for many managers in the communications field. Yet, unless communications managers efficiently read the continuous flow of industry information, their chances for successful careers diminish.

Tom Watson Sr. understood the importance of reading. Watson left NCR Corp. in 1914 to form what eventually became IBM. He brought along a number of ideas passed down from John Patterson, his mentor and the chairman of NCR. One concept Watson hoped to incorporate in his fledgling company was Patterson's five-word motto for success: "Read. Listen. Discuss. Observe. Think."

Reading has been billed as an intellectual process that occurs only when the body is at rest. Thus, reading is often equated with leisure activity.

Students pouring over textbooks look like they're working. But often, employees seen reading books, trade journals and professional newspapers aren't given as much credit. Somehow, reading on the job looks suspiciously like malingering. Only in academic or research jobs does reading appear active or productive. Consequently, other readers must peruse secretly. They can read on the bus or at home, but they must not read at the workstation.

Granted, our employers are not paying us to read about network technology, trends and theoretical concepts. Our job descriptions overflow with transitive verbs such as research, recommend, install, maintain, diagnose, repair and report.

However, these jobs cannot be done effectively if the manager has not kept up with changes in the communications industry. Unless a person has an unlimited travel budget to attend seminars and conferences, the only efficient way to keep pace is to keep reading.

There are dozens of publications covering this field, with a wide range of perspectives. Of course, no one can read every article. Depending on the company's needs, some intelligent skimming of the material should allow managers to sift out the articles that will most benefit their companies.

To abstain from reading is to shut oneself off from the rest of the world. And in this age and industry, that's the fastest course to failure.

Schmall is network systems manager for an insurance holding company.

▶ USER MEETINGS

NUA to mull standards

BY MARGIE SEMILOF
Senior Writer

Standards and interconnection will be among the key points of discussion at the Network Users Association (NUA) semiannual meeting, to be held at Boston's Park Plaza Hotel on April 28-30.

According to NUA President Michael Harrop, the NUA's primary concern will be to encourage the development of national and international standards, in addition to working for the creation of similar strategic objectives between users, vendors and the standards community.

"We plan to present our ideas and hope that those groups will either respond by giving us what we want or by telling us why our goals are unrealistic," he said.

The group also plans to discuss bringing other vendor-specific users groups together for future NUA meetings.

Harrop said the increasing number of specific users groups makes it difficult for interested members to attend each meeting that addresses their networking questions. By bringing the smaller meetings together, users will still be able to meet with vendor-specific groups as well as a larger industry consortium. NUA hopes to collocate its fall meeting with the Sytek, Inc. users group.

The certification of data processing equipment is another issue that may be discussed at the spring meeting. Although Harrop said that many U.S. manufacturers have been opposed to the idea in the past, the newly created standard group, Corporation for Open Systems, is setting up laboratories for testing.

"If users want to buy a standardized product line, they want assurance that it will work," Harrop said.

"Customers do not care if the testing is done by the manufacturer or by a third party. It is important the certifying agency has the credibility to stand behind the product."

The NUA roster currently lists approximately 100 member organizations. Harrop said most members are from a data background. This is in contrast to members of the International Communications Association, which Harrop said he perceives as having more of a voice orientation.

NUA members are both large multinational companies and smaller organizations.

Harrop said problems of networking for large companies are just as applicable to smaller companies, although they may differ in scale.

Enrollment for the annual spring meeting costs $125 for members of NUA. The cost to nonmembers is $275.

For information, write NUA, Suite 400, 2111 Eisenhower Ave., Alexandria, Va. 22314.

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EQUIPMENT LEASING

JEFFREY M. KAPLAN

Leased-cost alternatives

Purchase or lease? Communications managers now have a greater choice when faced with this question, thanks to the rapid growth of the third-party leasing business in the communications industry.

Leasing companies are not only offering customers flexible financing arrangements on new equipment, but they are generating attractive deals on used equipment, which they must sell as customer leases expire.

In 1985, more than $40 million worth of used telecommunications equipment was sold in the U.S., compared with $12 million in 1984 and $8 million in 1983. Used equipment sales are projected to reach $1 billion by 1995, while the number of used telecommunications equipment dealers is growing at about 50% per year. This tremendous growth in the leasing and secondary equipment markets began with the breakup of the Bell System.

Since the AT&T divestiture, users have been forced to assume greater control of their communications operations to compensate for the absence of a full-service supplier. However, many users are reluctant to invest the vast capital necessary to purchase new communications equipment during a period of rapid technological change.

Continued fear of technological obsolescence combined with budgetary constraints has made leasing an attractive alternative to purchasing.

Comdisco, Inc., the nation's largest independent third-party leasing company, expects telecommunications leasing to account for 25% to 30% of its business by 1990. Several other major leasing companies, which until recently were only involved in the computer leasing business, have reported significant telecommunications business in the past year.

Kaplan is senior industry consultant for the Communications Research Group at International Data Corp. in Framingham, Mass.

The DP market squeeze

Third-party leasing companies have traditionally operated in the computer industry. Increasing competition in computer leasing has these companies searching for new markets to enter.

Though the data-processing equipment marketplace continues to grow at a rate of 25% per year, competition among lessors and broker and dealers has become fierce, and lessees are reaping the benefits through lower used-equipment costs and lower rentals on new hardware.

Nearly 80% of all computer equipment bought, sold or leased by independent lessors over the last 20 years has been IBM-manufactured. As a result, the lessors have been playing a cat-and-mouse game with Big Blue.

In the past, lessors remarketed used IBM equipment in competition with IBM's new hardware sales force. IBM has attempted to squeeze the profit margins of the leasing companies by constantly restructuring its purchase and lease prices. Recently, IBM announced the formation of IBM Credit Corp. in an attempt to beat the lessors at their own game.

As the rate of IBM's growth and product shipments slow, the third-party leasing companies are trying to reduce their dependence on IBM and their traditional computer leasing business. They are applying their experience in the DP industry to the communications market.

The leasing industry

Leasing companies make money in a variety of ways. In most cases, the leased equipment is still worth something at the end of the lease. The lessor factors in this residual value as a reduction in the lessee's monthly payment. The lessor receives the residual value when the equipment is returned at the end of the lease.

The key to the lessor's success in the secondary market has been the equipment's reliability and staying power, which translates into residual values. This is a direct result of IBM's blanket maintenance coverage and support for its equipment, no matter who owns it or how many times it has been sold or

CORPORATE FINANCE

JEFFREY ROTHFEDER

The perils of Paradyne

Sometimes bad news comes as a relief for a corporation, particularly when it distracts the public from scrutinizing internal conditions that are far worse. This is the case with Paradyne Corp. of Largo, Fla. Once an up-and-coming star of the data communications industry, it has lost $31 million in the last fiscal year. According to analysts, it is in danger of more financial bleeding during the coming years.

Despite its current disastrous condition, Paradyne is best known today in investor and user communities for its tangled legal affairs. In March 1983, the Securities and Exchange Commission (SEC) filed a complaint against Paradyne alleging the firm misled the investor community in 1981 while obtaining its $82-million contract to supply intelligent terminals to the Social Security Administration (SSA). This action was settled last year in September. Paradyne neither admitted nor denied the allegations and agreed not to violate SEC laws in the future.

But if Paradyne thought it was out of the woods, it was wrong. From then on, the trees got thicker and the bushes thornier. In December, a federal grand jury indicted the company and some of its present and former officers — including board chairman Robert Wiggins and three vice-presidents — for defrauding the SSA during the procurement process for the intelligent terminal contract.

Paradyne officials allegedly showed the SSA an empty black box with blinking lights, described it as a highly advanced encryption device and then lied to the agency when describing the commercial availability of the equipment that forms the heart of the intelligent terminal. The trial is scheduled to begin in September, but already Paradyne has been suspended from doing any new business with the federal government.

Losing Washington as a customer is a blow not easily blunted. Paradyne, with sales of $290 million last year, stands to be out as much as $20 million in annual revenue from the government's action. What's more, estimates are that the company now faces at least $2 million in legal fees, and numerous man hours and distractions that cannot be quantified, in building its case. Paradyne calls the charges "outrageous and so lacking in foundation as to be ludicrous."

As dismal as its relationship with the federal government seems and as low as its credibility may have sunk, there is another side to the Paradyne story that the litigation has temporarily masked. Analysts say even if the company had avoided the taint of lawsuits, it would have been on the ropes because of the corporate misdirection that began about four years ago. That, on close inspection, is the prime reason for Paradyne's decline from earnings of $27 million in 1982 to its $31 million loss last year.

For more than a decade since its founding in 1969, Paradyne's strength was in modems. The firm was innovative in developing the earliest high-speed modems and the first microprocessor-based modems operating at a wide range of baud rates. But realizing the market for modems could easily be buffeted by changing trends in communications, in 1980 Paradyne diversified into DP and data communications equipment.

This strategy was a mistake. All of Paradyne's efforts, from the Response distributed data processing system to the 8400 intelligent terminal — the machine that the SSA contracted — to the Pixnet family of products that allow IBM computers to be used in varied communications networks, were either outright failures or secondary players in a rapidly maturing marketplace.

Throughout the 1980s, the bold upstart in modem technology rapidly slipped in customer share, and earnings suffered concomitantly. The Paradyne problem, at heart, is a research and development problem, according to analysts. As it expanded into competitive marketplaces that were outside of its technological expertise, it bucked up against such major high-tech firms as Racal-Milgo, Inc., Motorola, Inc.'s Codex Corp., the Bell operating companies, Timeplex, Inc. and IBM. Many of these companies, officials at Paradyne conceded, have greater financial and technological resources than Paradyne.

Moreover, the R&D problem eventually turned into a corporate marketing quandary. As Paradyne officials scurried to keep promised products moving on a timely basis, they found themselves having to turn increasingly to OEM and technology licensing agreements with other companies.

For the Paradyne customer, then, what does this all mean? Andy Shopick of the Gartner Group said it best: "If I were a current customer, I'd be worried. If I were a potential customer, I would probably look toward another company right now. Paradyne is distracted by the federal government, by its financial and product performances and by its continuing loss of credibility with the investor, analyst and user communities. All of this can do nothing but translate into trouble about its equipment."

Rothfeder is a free-lance writer based in Wyckoff, N.J.

leased. The leasing companies usually retain the title to their leased equipment. They often sell the tax benefits associated with the title to financial institutions and investment houses that use the rights to the equipment's depreciation, investment tax credit and residual value to defer income. These are the tax benefits a user would be entitled to if he had purchased the equipment. Under this tax-leveraged lease, the user trades tax benefits to the lessor for a lower monthly lease rate, reducing out-of-pocket equipment expenditures.

Surprisingly, users terminate 60% to 70% of the leases signed in the computer industry before the end of their terms because they outgrow the capabilities of the DP equipment. Leasing companies usually help the client by subletting the original equipment and leasing new equipment to the client.

AT&T's effect

Although IBM is the dominant force in the market for leased computer equipment, AT&T is striving to become the dominant supplier in the communications industry. AT&T Information Systems is soliciting third-party IBM hardware dealers and lessors to sell used AT&T private branch exchanges, key systems, central office switches and data communications equipment. This bold approach is the exact opposite of IBM's.

AT&T, which has already regained its dominant role in the communications industry, stands to improve its advantage by becoming the supplier of choice among leasing companies. AT&T is trading on its name and the reliability of its equipment to gain a competitive advantage in attracting the increasing numbers of prospective users that are considering leasing.

Because its ability to be upgraded and its modularity have convinced lessors of the equipment's residual value, the vast majority of today's telecommunications leasing involves AT&T equipment. AT&T, like IBM, has made a commitment to maintain and support equipment purchased in the secondary market. Its full-service approach to support, service and maintenance makes it very attractive.

The emergence of AT&T Credit Corp. has also encouraged and stimulated interest in communications equipment leasing among

See **Leasing** page 34

▸TELETOONS — By Phil Frank

Did you get the memo about the new password?

SIDEBAND TRANSMISSION

MARK WINTHER

Data on the air

More than 11,000 television stations, FM radio stations and cable television systems broadcast in the U.S., each using only a portion of its transmission capacity to deliver programming to audiences.

The excess bandwidth allotment, known as sideband, is emerging as a viable pipeline for transmitting data and text.

New technology and federal deregulation are turning sideband into revenue-producing networks, while broadcasters are becoming direct competitors with the telephone companies.

Sideband is referred to as subcarrier on FM radio signals and as vertical blanking interval (VBI) on TV signals. Related technologies, which also have data broadcasting potential, include AM radio stations and paging systems.

Using sideband, senders and receivers save money by avoiding long-distance and leased-line telecommunications charges. The use of a broadcast medium means that the costs are both user-insensitive and distance-insensitive. That is, the transmission cost remains constant, regardless of the number of reception points. In turn, the cost is not affected by how far the user is from the transmitter. But sideband also has some limitations. Its major drawback is that broadcast technology is not interactive.

In addition, error correction and detection cannot be guaranteed, because there is no way for the host transmitter to know if the user received a garbled message. Finally, all broadcast signals are affected to varying degrees by atmospheric conditions and are, therefore, less reliable than telephone lines. Sideband networks are being used for information broadcasting, electronic publishing, data base distribution, software delivery and education over the airwaves.

But the bulk of broadcast data services are being used for up-to-the-minute quotes to stock brokers for stocks, commodities, money markets and other financial information.

Increasing competition in the financial quote business is partially due to a New York Stock Exchange decision to make real-time share prices available at a lower fee.

Also, the proliferation of personal computers in the financial community means that vendors supplying financial quotes no longer have to provide terminal equipment to recruit customers.

Vendors distributing financial quotes via broadcast systems include Quotron Systems, Inc., the earliest player in the business; Dataspeed, Inc., an IBM/Merrill Lynch-acquired venture that uses the VBI of the Public Broadcasting System television network; and Data Broadcasting Corp., which operates over the VBI of the Financial News Network, a nationwide CATV network.

The Ann Arbor, Mich.-based Automatic Data Processing, Inc.'s (ADP) data services division is currently considering broadcast distribution. Increased competition in the financial quotes market is driving down prices and margins. As a result, network vendors are looking for other markets. In addition to brokerage houses, vendors have targeted retailers, supermarket chains, wire services and data base publishers as potential customers.

Maxnews Financial Network publishes a New York money market report and distributes it via the Arlington, Va.-based MultiComm Telecommunications Corp.'s FM subcarrier network.

Lucky Stores, Inc. uses Salt Lake City-based Bonneville Telecommunications Corp. to provide each of its grocery stores with up-to-the-minute information about pricing, promotional specials and corporate announcements.

Bonneville Telecommunications was one of the first providers of FM subsidiary communications authority (SCA) data delivery.

It has sideband agreements with FM radio stations across the U.S. and links these stations via satellite.

Furthermore, Bonneville has a distinct advantage over its competitors. In 1984, the company integrated its FM SCA network with General Electric Information Services Co.'s value-added network to provide interactivity. In response, other sideband networks may be forced to form their own hybrid systems via alliances with electronic mail services and other value-added carriers.

Several other players are planning broadcast network services. Indesys, Inc., backed by ABC and Epson America, Inc., says it has signed on Avon, Businessland Corp., Telerate Corp. and Peat, Marwick, Mitchell & Co.

Winther is director of new communications services at Link Resources Corp., N.Y.

NETWORK WORLD

Features

April 28, 1986

As head of one of the largest nonmilitary networks in the world, Haskell Cehrs has nearly 9,000 nodes at his command. Cehrs, DEC's manager of corporate telecommunications, has to keep on top of a world of issues. The secret, he says, to handling his daily work load of tariffs, standards and changing technologies is to divide up the problems into alligators and ducks.
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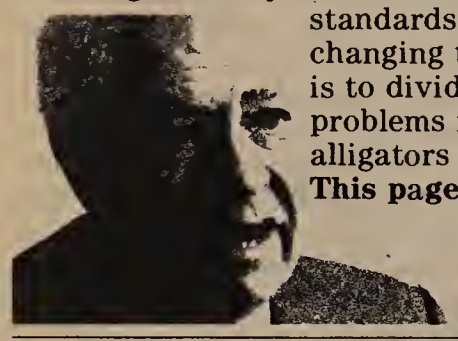


The state of standards
A layer-by-layer look at what's happening today with communications network standards helps put it all together for users purchasing hardware and software.
Page 1.

Lab builds nuke-age network
Los Alamos National Laboratory served as a think tank for the first atomic bomb. Today, it supports the world's largest and most complex academic network.
Page 27.

▶ PROFILE

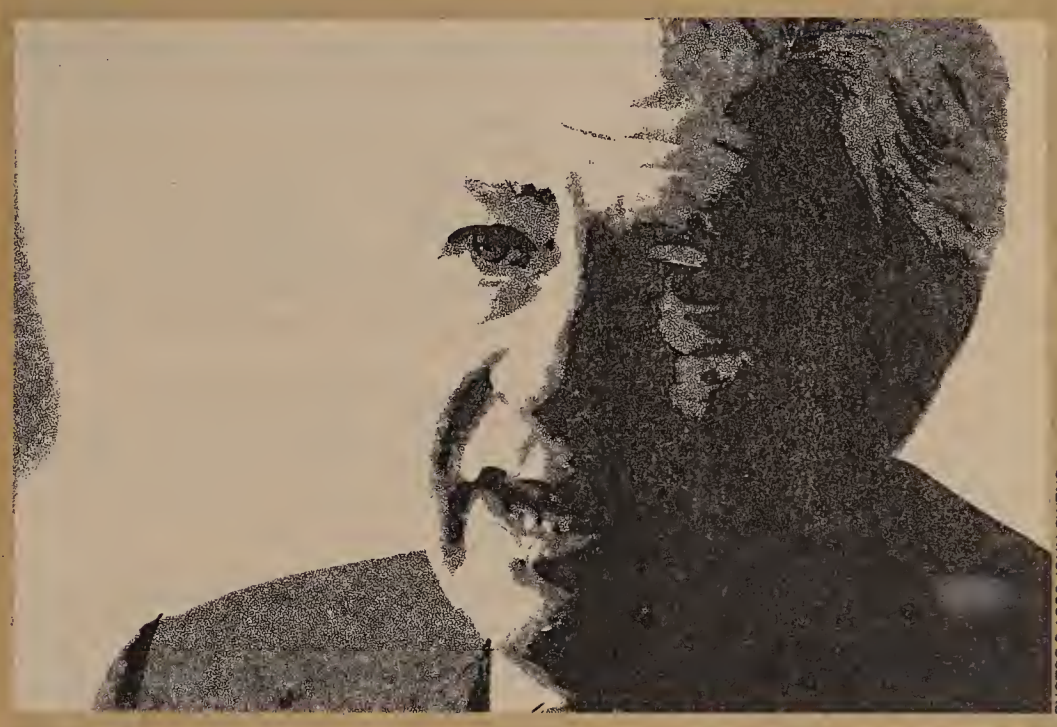
DEC's Haskell Cehrs

Behind his Southern drawl and easygoing manner, Haskell Cehrs is an astute, widely traveled manager who earned his spurs on the data processing side of the business. After six years as Digital Equipment Corp.'s European information services manager, Cehrs became fascinated with the international telecommunications regulatory situation.

Recognizing the increasing importance and visibility of the communications function, Cehrs seized the opportunity to become DEC's corporate telecommunications manager in 1984. He recently shared his thoughts about management with Network World *Features Editor Steve Moore.*

What's the scope of your network domestically and internationally?
We're hooked up into, I believe, 39 countries. We have a data network that runs into almost every subsidiary we have worldwide. We're currently sitting at slightly less than 9,000 registered nodes on the network. Every Friday night at midnight, we take a snapshot of who's alive on the network. We normally will run between 4,000 and 5,000 nodes live at midnight on Friday night. It's a fairly extensive network. We move billions of bytes a year across it.

"ISDN seems to be of much more interest in the European community than it is here."



PHOTOS © 1986 JOHN OWENS

What domestic and international regulatory issues concern you the most?
The regulatory issues we are most concerned with are the tariffing issues: what services people can offer, what do they not offer and what's going to happen to the tariffs. There are a lot of people looking at them, fooling with bypass.

Ultimately, what is that all going to mean? If it causes the local consumers' phone prices to double, what will the [Federal Communications Commission] and the [public utility commissions] do about that? I don't think anybody knows. Of course, now you have all of the difficulties dealing with the long-line carriers and having to get details on each end from the [regional Bell operating companies].

As we move toward integrated services digital networks, do you think the problems are going to get bigger?
I don't know. We've looked at the AT&T [Software Defined Network], which really isn't ISDN. ISDN seems to be of much more interest in the European community than it is here. There is some activity under way here now, but I don't know what it means. I don't think anybody does.

Do you think AT&T and the Bell operating companies should be completely deregulated?
The ruling to let AT&T more or less rejoin puts the RBOCs at a tremendous disadvantage. If they're going to do that for AT&T, then they ought to do that for the RBOCs, too. I don't see that there would necessarily be anything wrong in letting them offer nationwide service. It certainly would increase competition.

☞ Continued on **page 26**

From **page 25**

What's the extent of your use of very small aperture terminals (Vsat), microwave and private fiber?
We're not using a lot of microwave except in small-campus kinds of arrangements where we've got multiple buildings that are close together. We're doing some fairly extensive work in the fiber-optics area.

We are in the process of installing 82 miles in eastern Massachusetts and southern New Hampshire that we have contracted for. And we have a number of physical locations hooked up with privately owned fiber.

Do you have a Vsat network?
We've got a satellite/video network that's one-way video and two-way audio. We're in the process of installing some satellite links in Europe.

Would you describe yourself as DEC's own best beta site?
Yes, there are some real advantages to that. We'll very often set up test networks, and we'll test out the new products as they come. If they really look good, we'll go for it. If they don't look good, we normally end up working with the engineering department. We point out that if we can't use this, probably a lot of other people can't use it either. We're DEC's biggest single customer. I don't know of anyone else who even approaches the 9,000-node network.

What are the features your users like the best on an electronic mail system?
The answer to that is simple. They want it to be reliable, very fast and cheap.

What concerns have you had to deal with in E-mail in terms of the messaging standards, X.400 and nodes in different countries?
The nodes in different countries haven't been a major problem because we do business in English. We're in compliance legally with what we're doing because we either go private net or public net. We do not mingle the two, which is the fundamental thing [Postal Telephone and Telegraphs] don't want you to do.

As far as the X.400 standard, the new products under development right now, which we will be the test bed for, are aimed at 100% compliance with the standard.

That causes us a little problem in the heterogeneous environment we're in now because it means we sometimes have to back up and fix an existing product to be compatible when we know we're going to throw it away. But it's necessary.

What problems do you have to deal with, in terms of formats and standards, for E-mail documents to be moved into a word processing system?
What do you allow to be transferred over the network and what don't you allow?

If you send the wrong document format to the wrong terminal, it can blow up the terminal. You're expecting a graphics terminal on the other end, and there is no graphics terminal; it's a dumb terminal. What you get is meaningless gibberish.

At one point, we didn't think about that. We had one videotex data base up. Someone logged into it without a graphics terminal. The only way they were ever going to get out was to turn the machine off. But we learn from those things, and we don't let that kind of stuff happen anymore.

We're concerned about compound documents and the ability to take all the stuff off of a smart terminal, and mix, match and build the mail messages, and then transmit them. We're working very closely with engineering in those areas.

What problems are arising with information policies from different countries in the transfer of information across borders?
None at all. We stay current with the transported data flow legislation. We know where we're allowed to do things, where we're not allowed, what can be sent and what cannot be sent. We try very hard to stay in strict compliance with that.

Is that monitored closely?
It's monitored more by us than by the governments, simply because we don't want to be guilty of transgression.

Who has the most restrictive policies of the countries you've seen?
I would guess Sweden. Their concept is to protect the human rights side of the issue. They have some very interesting laws on the books that are difficult to comply with.

> *"You have to keep up with the state of the art."*

How does a company that is trying to set up an international E-mail network minimize problems with the PTTs?
Every PTT is different. You normally have to deal with them in their local language. Although you could deal with them in English, they're much more receptive if you have someone who is dealing with them in their language. You must understand their rules, and you must also understand what is customary.

If you don't have expertise in the given country, there are some consulting firms around the world that have that expertise. I would highly recommend you don't go blundering in. I did that when I first went to Europe. I thought "Hell, it can't be all this tough."

I went into one country where we were having problems getting a modem, and I carried the modem in my suitcase. I plugged it in, and sure enough, it worked. About an hour later, we got a call from the PTT suggesting that if we didn't get that modem off the network, we weren't going to have any more service from the PTT.

They have the ability to figure that out. I was just trying to be "Mr. Nice Guy," go in and solve the business problem.

I'd been over there all of three months. I got that modem out of the country very quickly — the next flight out actually. And I showed customs that I was taking it out.

Does using foreign equipment, in both senses of the word, cause problems on your network?
Yes, it does cause problems. But we've learned over the years to coexist and to work out those problems.

> *"It's very easy to become entrapped."*

We had one guy who ordered a circuit that was totally nonstandard; it was U.S-standard-only. I finally called him up, and I said, "Look, where are you going to terminate it? You can hook your end up, but we've got nothing to hook it on the other end."

It took months in some cases to get people to understand that there were very specific rules and regulations. We had to adhere to those if we were going to do business in those countries.

When I went to Europe, I was so naive, it was unbelievable. I wrote myself a list of 100 things I wanted to accomplish.

After six months there, I looked at the list again, and 40 of them were absolutely not able to be done in that environment.

There's no way I can put together one plan and implement it worldwide. You have to put together a dozen plans all aiming toward the same end result, and then you try to implement.

Do you have any tips you would pass along to other managers who are dealing with large networks like yours?
You have to keep up with the state of the art, but you can't become enamored with it. The key factors when it's all said and done are that it has to work, it has to be reliable, and it has to do what you want it to do. Hopefully, it will be cost-effective at the same time. It's very easy to become entrapped.

Most companies were not positioned to handle divestiture. So divestiture occurred, and now who do they turn to for support? It's been our experience that if you turn to a single vendor, the vendor ends up managing you instead of you managing your vendors. We try to keep two or three reliable sources for basically anything we want to do.

We don't play them off against each other. But it gives us the flexibility of doing the right thing as opposed to having to use just one product in all instances.

How often do you reevaluate the network?
It's an ongoing thing. We're constantly watching the market and the tariff structures. We're also constantly monitoring what we're doing on the network today vs. what we were doing on the network six to nine months ago. From time to time, we take snapshots. We analyze [each] snapshot and keep that data.

Then maybe six months later, we take another snapshot. We analyze that data, and we compare the two.

As you get a moving window, you can see an evolutionary process that throws up a warning flag that says even though your network is working right now, if you don't pay attention to what's happening on it, it could fall over dead one day. Then you'll say, "I didn't realize that."

It really is a constant process. In a networking space, you're almost never in the position where you can say, "OK, I've killed that one. Let's go on to the next one," because you've probably only wounded that one.

It's still out there kicking and moaning somewhere.

Back in the early days of computers, they were living things. The network tends to be too. Every time you get overconfident with it, it comes up and nips you a little.

I maintain that there are two kinds of problems: There are the alligators that you know you've got to get. If you don't, they're going to eat you. Then there are the ducks. If you don't watch them, every so often, they come and nip you on the rear end.

And it doesn't really cause you any damage, but it's painful. In the network, we try to divide up our problems into alligators and ducks.

You can get some very interesting regulations in the international sector. The best plan you could possibly put together isn't going to work if it's illegal on some segment of your network.

Out of the blue skies technologies, which ones are going to be alligators because people think they are way off?
Bandwidth management. Any large network manager has an ever-increasing demand for bandwidth. Demand is resolved is by getting another lead circuit or finding some way to acquire additional bandwidth.

That's going to eat us alive if we continue. We have to find some sort of methodology. Let people explain to us what their needs are. Let us find a way to meet the demand for bandwidth.

It's an area that's basically been ignored up until now. It's a real alligator, and it's really going to eat us up if we don't get on top of it. It's a question of management, rather than availability.

LOS ALAMOS

Lab builds nuke-age network

There's a network in New Mexico that pipes around more data than a dozen of today's fastest supercomputers can handle.

TOM BARRETT

BY PAUL KORZENIOWSKI
Senior Writer

LOS ALAMOS, N.M. — Set in a scenic mountain range in rural New Mexico, the think tank that spawned the atomic age is now the hub of the world's most sophisticated academic network. If this claim of the Los Alamos National Laboratory seems lofty, consider the following statistics:

- The laboratory processes more data each day than all that was processed by mankind before 1970.
- More than 28 trillion bits of information are stored on a common file system managed by IBM 3083 and IBM 4381 mainframes.
- The network supports 11 supercomputers and the communications division is adding one more each year.
- Close to 95% of the requests from the system's 8,000 users are answered within five seconds.

Norman Morse, division leader of a 385-person computing and communications division at the laboratory, oversees the Los Alamos network. Despite its impressive credentials, Morse says that the laboratory could easily use 100 times more processing power than it now supports. Unfortunately, no vendor is able to supply that kind of computing power.

The network system

The backbone of Los Alamos' communications system is its Integrated Computer Network (ICN), a broadband network capable of supporting transmission speeds of up to 50M bit/sec. ICN consists of 23 miles of coaxial cable and seven miles of fiber-optic lines, and it links 5,000 users in 100 office buildings within a 43-square-mile area around Los Alamos. An additional 2,000 users access ICN from other installations across the U.S.

Because the network is so large and complex, no commercial product can manage it. "Because we're on the cutting edge of technology, we had to develop a lot of the network protocols ourselves," says Hassan Dayem, communications group leader at Los Alamos. Laboratory engineers designed almost all of the network interfaces and software.

ICN has been evolving since 1970, when the laboratory first began linking its computers. As a result, some pieces of the network are more than 10 years old. Decisions are being made today for capabilities that will not be available until 1990.

The network supports three types of users: administrative, unclassified and classified. Approximately half of the 11,000 Los Alamos residents work at the laboratory. Many of these people perform administrative services, such as payroll processing for the University of California, which runs the laboratory for the U.S. Department of Energy.

Unclassified users work on scientific and engineering projects. Even though the laboratory is best known for its work on the world's first atomic bomb, professors and scientists also research such subjects as mineral resource evaluation, land use planning and world climate studies.

Finally, classified users have access to information used in nuclear weapons projects.

Los Alamos was chosen as the think tank for the nation's leading scientists when the U.S. developed the first nuclear weapon in 1943. J. Robert Oppenheimer, who headed the project, had a summer home near Santa Fe, N.M., and of-

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ten passed through Los Alamos. When he was charged with finding a rural setting where nuclear scientists could work secretly, he decided that Los Alamos was the perfect place.

The laboratory is still active in the development of nuclear weapons. Close to 40% of the laboratory's 1986 fiscal budget is earmarked for weapons systems, and the facility's defense arm supplies close to 75% of Los Alamos' funding.

Extensive security

To protect sensitive defense work, an elaborate security system has been put in place. A Digital Equipment Corp. VAX computer controls user access to the network, which is partitioned with classified and unclassified circuits. Information sent on a classified circuit is automatically encrypted using a National Security Agency scheme.

"We have an elaborate security system that automatically logs someone out and records the incident after three unsuccessful attempts to enter a password."

The sophisticated protection system has proven to be necessary. In August 1983, a group of Milwaukee teenagers was accused of illegally accessing a number of computer centers, including Los Alamos. The group, which was known as the 414s, for Milwaukee's area code, allegedly broke into computer systems at Security Pacific Bank, Milwaukee School of Engineering, Memorial Sloane-Kettering Cancer Center and the Los Alamos laboratory.

At Los Alamos, the hackers apparently used a dial-up line to gain access to an unclassified DEC VAX, according to John Morrison, network engineering group leader. Although there have been repeated attempts to access laboratory computers, none has been successful. "We have an elaborate security system that automatically logs someone out and records the incident after three unsuccessful attempts to enter a password," Morrison said. "Because of the type of data we use, we monitor all attempted accesses very carefully."

Most of the three classes of local users have direct network connections that support transmission speeds from 300 bit/sec to 150K bit/sec. The lines are primarily based on twisted-pair wiring.

Professors and scientists require the wide bandwidth for computer modeling and number-crunching applications, which are completed on workstations from Sun Microsystems, Inc. and Apollo Computer, Inc. as well as Tektronix, Inc. graphics terminals.

User access

A three-step process moves data from a terminal to a central processor. Some central processors are character-oriented; others are screen-oriented. The first step in the process routes data to Micom, Inc. data switches. These switches translate some data to the proper central processor format. They also concentrate data on high-speed links, so the laboratory makes the most economical use of its lines when accessing the 5,225 ports available on its computer systems.

Next, approximately 20 DEC PDP 11/40s, acting as front-end processors, concentrate and route network traffic. These processors are connected to devices from Gould, Inc. that operate much like packet assembler/disassemblers and translate information into synchronous packets. The packets are sent over the 50M bit/sec broadband network backbone.

Personal computers are gaining acceptance with Los Alamos employees, and a number of them work with IBM or Apple Computer, Inc. computers. A user can access any computer system on the network as long as he has the appropriate terminal emulation software. "We want to let the users access whatever data they wish," Dayem says.

Remote users access the network in four ways: dial-up lines, a local distributed data processing network, gateways from various research networks and GTE Telenet Communications Corp.'s packet-switching network.

Two 9.6K bit/sec lines connect the laboratory to GTE's Telenet packet-switching network. The connections are primarily used for

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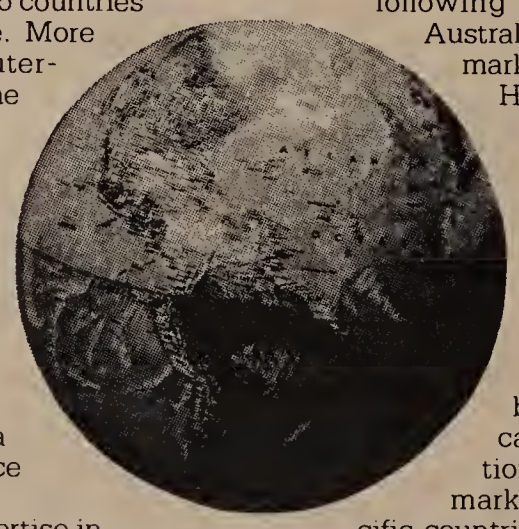

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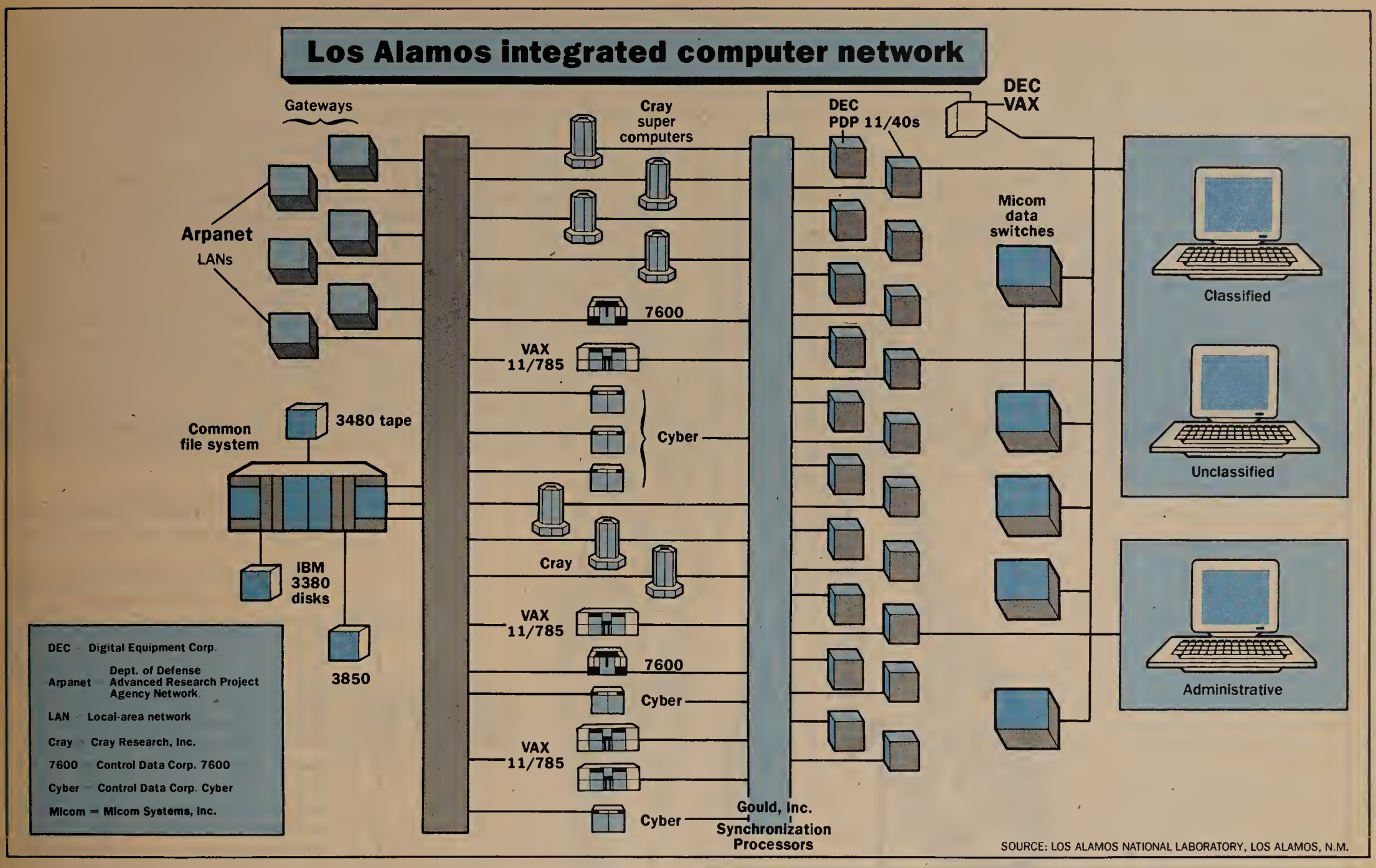

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administrative work, such as airline flight schedules. Los Alamos has approximately 150 dial-up lines that support transmission speeds up to 4.8K bit/sec.

The laboratory's distributed network, Xnet, was designed by Los Alamos engineers. Many departments work with the more than 90 DEC VAXs scattered throughout Los Alamos. Whenever these users need to access a larger computer system, they enter through an Xnet gateway that operates at speeds up to 25K bit/sec.

The Los Alamos facility shares nuclear weapons research information with 11 other laboratories and government agencies through the Nuclear Weapons Complex Network and the Wideband Communications Network. A DEC VAX 11/750 computer serves as a gateway and supplies encryption functions between Los Alamos and the other facilities.

In addition to sharing information with other academic institutions, the laboratory works with government agencies such as the U.S. Department of Defense (DOD) and the Department of Energy. Information for all these agencies can be shared on Milnet, a spin-off from the DOD's Advanced Research Project Agency Network that has been broadened to support a number of nongovernment research centers.

ICN is extremely sophisticated, and steps are being taken to ensure that it remains a state-of-the-art system. Morrison lists four areas of improvement: replacement of the front-end processors, incorporation of common protocols, improved network management and establishment of gateways to local-area networks.

> *"Because the network supports proprietary protocols, Los Alamos programmers have to develop most application software."*

Because DEC no longer manufactures the PDP 11/40, the laboratory plans to migrate to a new front-end processor. "We haven't made a firm decision, but it looks like we will probably use DEC's Microvax II," Morrison said.

Because the network supports proprietary protocols, Los Alamos programmers have to develop most application software. The laboratory has committed to purchasing commercial products, a step that should cut operating costs. Morrison thinks the organization will attempt to incorporate the International Standards

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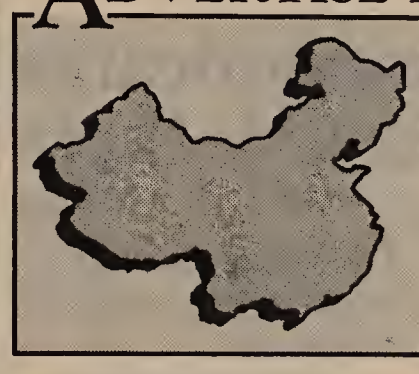

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▶ INTEGRATION

Merging voice and data

The Los Alamos National Laboratory is one step ahead of many corporations in integrating its voice and data departments. Although many large corporations are taking the first steps in this direction, the laboratory combined its two departments more than four and a half years ago.

"I don't think we would have been able to expand our data network as we have in the last few years if we had to work with two separate departments," notes Hassan Dayem, who oversees both data and voice functions as communications group manager. By combining the two functions, one department is responsible for ordering and maintaining telephone lines for both data and voice applications.

Although the two managerial functions were melded, the laboratory currently supports autonomous data and voice networks. "Our networks will probably always be somewhat separate because the data network requires such high transmission speeds," Dayem says. The data network, called Integrated Computing Network, operates at speeds up to 50M bit/sec (see story Page 27).

Voice functions are handled by a central office switch managed by Mountain Bell. The laboratory has more than 10,000 telephone instruments at 100 office buildings within a 43-mile radius of Los Alamos.

Mountain Bell recently upgraded its AT&T 1ESS to an AT&T 5ESS switch. The new switch was the first that Mountain Bell ordered and indicates the priority given to the Los Alamos facility. "Mountain Bell has been cooperative in supplying us with the equipment and services we need," Dayem says.

The data and voice networks will not always remain completely separate; Dayem says he is planning to integrate some equipment and services. Data and voice switches will enable the networks to share some hardware and transmission facilities. "We are currently evaluating a number of switches and could formulate a plan by the end of the year," he says.

— *Paul Korzeniowski*

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Organization's Open Systems Interconnect protocols wherever possible.

Despite ICN's complexity, it supports only rudimentary network management and control facilities. One package that runs on an IBM Personal Computer XT and examines long line connections will be installed later this year.

The laboratory has examined network management packages and found them lacking. "The cost to properly equip our network would be almost as much as the network hardware," Dayem says. "There may be 25 connections for one line, and each connection requires its own diagnostic equipment." Despite the expense, the laboratory plans to upgrade its network management facilities as soon as it can find suitable equipment.

"The lab has examined net management packages and found them lacking."

Approximately 14 personal computer networks will be integrated into ICN. Security is the chief reason for the slow incorporation of all laboratory networks. "We have to be very careful how we choose to integrate personal computer networks," Dayem says. "We may divide users into classified and unclassified networks."

Morse claims the laboratory could use 100 times more processing power than the present capabilities. Los Alamos is working with a number of parallel processing projects that some day may be able to supply that kind of horsepower.

When that type of processing power becomes available, ICN may become 100 times more complicated than it is today. "I've been here nine years, and I'll probably stay the rest of my life," Dayem says. "There are plenty of interesting applications to keep me busy."

▶ CONTINUED FROM PAGE ONE

The state of standards

standardized products according to a set timetable. Manufacturers are abandoning the protocol business and rallying to the support of nonproprietary standards. The exception to this is IBM, which continues to introduce and attract support for its de facto standards successfully.

Even IBM, though, is beginning to acknowledge nonproprietary standards, especially at the lower levels of the ISO's Open Systems Interconnect (OSI) model.

Network hardware standards

Standards can be grouped into three levels. The lowest level, which corresponds to Layers 1 (physical control) and 2 (link control) of the OSI model, defines the network hardware. At the hardware level, there are three acknowledged network-access standards: Ethernet, token bus and token ring. Each of these has attracted a group of communications equipment manufacturers that more or less adhere to that standard.

However, because there are differences among vendors' implementations, the hardware standards are merely convenient ways to categorize network hardware and have little significance for hardware integration. In fact, the key element in the standardization process is hardware independence. As long as compatibility exists at the higher levels of the OSI model, the user can choose a variety of hardware.

The subnet

Hardware integration and compatibility,

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according to the new standardization efforts, are now governed primarily by the middle communications level in Layers 3 (network control), 4 (transport control) and 5 (session control) of the OSI model.

This level, called the subnet, handles the communications services on the network. All of the many types of network hardware are moving toward the support of a small number of subnet protocols. This permits one type of hardware to be replaced by another type without the necessity of altering the higher network layers or the applications. In other words, the network becomes hardware-independent. There will be no single dominant network hardware protocol that will push the other protocols into premature obsolescence.

Standardization at the subnet minimizes the cost of migration to totally new hardware systems. Most hardware upgrading can leave costly cabling in place, while the network interface is replaced. If a cable type is selected with a careful eye to projected growth and performance requirements, it will be usable for many years, reducing the long-term cost of the system.

For personal computer networks, the present dominant standard at the subnet level is the Network Basic I/O System (Netbios). A key component of personal computer network system software, Netbios is primarily firmware embedded in the PC Network and Token-Ring boards.

It is also the current standard to which software is written. IBM is supporting Netbios on its current networks and has said it will continue this support on future network products. With this backing, Netbios' compatibility has become a virtual requirement for personal computer networks.

In addition to defining network communications services, Netbios provides a network-to-application interface. Some applications, such as gateways and network file servers, need to communicate directly with nodes on the network. These applications can hook into the network through the Netbios interface to conduct peer-to-peer communications. In its current implementation, however, Netbios is slow, and its design makes internetworking difficult. Another IBM protocol, LU 6.2, is already in the wings and will certainly become an alternative to Netbios.

LU 6.2 is part of IBM's Systems Network Architecture, which is the company's overall office communications plan. LU 6.2 provides roughly the same services as Netbios, that is, peer-to-peer communications. But while Netbios makes internetworking almost impossible, LU 6.2 is designed to optimize internetworking among distributed systems.

The only apparent drawback to LU 6.2 is that it requires four times as much software or firmware code as Netbios. That overhead, plus the fact that LU 6.2 is not yet widely supported on personal computer networks, seems to guarantee that Netbios will be around for a while.

But does that also mean that Netbios-compatible products won't find a subnet to run on in a few years? Probably not. It's more likely that network companies will follow IBM's lead again and support both standards within the same network products. (IBM supports both Netbios and LU 6.2 on the Token-Ring adapter card.)

And the subnet saga doesn't end here. The ISO has been busy creating subnet protocols based on its OSI model. These protocols are used in the new Manufacturing Automation Protocol (MAP) and Technical and Office Protocol (TOP) standards, which General Motors Corp. and Boeing Computer Services Co. are pushing, respectively. MAP and TOP mark perhaps the first time that user companies have taken a controlling role in the development of standards. Their stated reason for taking this activist position is to lower the cost of system integration — a cost that may be as much as half the total cost of a completed installation.

Digital Equipment Corp. and Hewlett-Packard Co., along with scores of other companies, have agreed to support MAP, TOP and the OSI protocols. Some of the personal computer network companies are also expected to add OSI protocol support during 1986.

That will give network applications three subnet protocols from which to choose: Netbios, LU 6.2 and OSI. However, it's unlikely that all three subnets will be available as firmware on the same network adapter cards.

Although diversity is an advantage at the hardware level, it creates problems at the subnet level. The biggest problem is in internetworking dissimilar subnets. An elegantly transparent internetwork can be built on top of dissimilar hardware, provided that the middle and upper network layers are identical.

Although circumstances are forcing vendor companies to support multiple subnets, user companies may be wise to standardize on a single subnet protocol.

The presentation layer

One step above the subnet is another important network-to-application interface: the presentation layer, which is Layer 6 in the OSI model. Some applications should interface at the subnet level; however, the vast majority of software applications should interface at the presentation layer.

In personal computer networking, MS-DOS 3.1 now defines the presentation layer. MS-DOS 3.1 is the first version of MS-DOS to contain networking primitives for file and record locking. Applications can't lock a resource directly; they must request that service from the network OS. Because of the DOS' preeminence in the micro world, these networking primitives became the de facto standard network-to-application interface.

When DOS 3.1 was introduced, virtually every major network company agreed to support the new standard. Any network that supports MS-DOS 3.1 can run any software application that also supports MS-DOS 3.1. This greatly reduces the number of software versions a developer must write and support. That, in turn, lowers development costs and encourages the development of new products.

Applications level standards

Up through the presentation level, standardization is working well, although with a few hiccups here and there. At the application level, Layer 7 of the OSI model, however, the industry has far to go before real standards appear. This is the area where users will see the greatest unwillingness among vendors to support nonproprietary protocols.

This uppermost level is where the application-to-application interface must be built. Because it allows the passing of documents from one environment to another, standardization at this level is an absolute necessity to make electronic mail truly universal.

Today, the common way to pass a document is to convert it to Ascii and ship it to the new environment. Sometimes it seems just as useful to ship a can of alphabet soup instead. The Ascii translation loses all of the document's formatting codes, and that can mean the loss or alteration of much of the document's meaning. In addition, reformatting is often a laborious task.

Eventually, the completed OSI protocols will include a solution for standardization at the application level. Meanwhile, another solution is emerging from within IBM's Document Content Architecture (DCA).

DCA is part of the SNA Disoss protocol. Widespread Disoss or DCA support has been slow in coming and may never occur. However, DCA contains a formatting protocol called Revisable Form that many software vendors are accepting.

These formatting protocols permit the movement of documents from one environment to another without the loss of formatting information.

Revisable Form is now supported by many word processing packages, including Displaywrite, Multimate and Word Perfect. Where it's available, it provides a functional application-to-application interface. However, supporters of the OSI protocols and many mail program developers do not accept Revisable Form. Thus, users have to continue waiting for a real standard in this critical upper level.

Fortunately, standardization is not an all-or-nothing situation. Looking at all levels of the communications process, the currently available standards answer many of our needs: hardware independence, internetwork capability and a standard application-to-network interface. Most importantly, the direction of standardization is clear enough to let users do long-range systems planning.

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52. Supervisory/Staff: Supervisor, Head of System Design, Analysis, Applications

Others
75. Consultant
80. Educator
85. Financial Analyst
90. Marketing/Sales
95. Other _____

3 Job Function
Which one of the following best describes your functional involvement with communications (data, voice, and/or video) products? Circle ONE only.

Corporate
1. Business Management, Planning and/or Development

Communications System/Network
2. Management, Planning and/or Development
3. Implementation and/or Operation
4. Other _____

4 Which one of the following best describes the primary business activity of your organization at this location? Circle ONE only.

Consultants
11. DP/Communications Consulting Services
12. Consulting Services (except DP/Communications)

End Users
13. Manufacturer (other than computer/communications)
22. Finance/Banking/Insurance/Real Estate
23. Education
24. Medicine/Law
25. Wholesale/Retail Trade
26. Public Utility/Transportation
27. Mining/Construction/Petroleum Refining/ Agriculture/Forestry
28. Business Services (excluding DP/Communications)
29. Government: Federal
30. Government: State/Local

Vendors
41. Carrier: including AT&T, BOCs, Independent Telcos, Public Data Networks, Intern'l Records Carriers
42. Interconnect
43. Manufacturer Computer/Communications Equipment
44. Value Added Reseller (VAR), Systems House, Systems Integrator
45. Distributor
46. DP/Communications Services (excluding consulting)
95. Other _____

5 In which ways do you typically become involved in acquiring communications products (data, voice, and/or video) and services? Circle ALL that apply.
1. Recommend/Specify
2. Identify/Evaluate Potential Vendors
3. Approve the Acquisition
4. None of the Above

6 Check ALL that apply in columns A and B.
A. I am personally involved in the acquisition process (specification, selection, approval) for the following products and services:
B. These products and services are presently in use at this location:

A	B	*Product/Services*
		Computers
☐	☐	01. Micros
☐	☐	02. Minis
☐	☐	03. Mainframes
		Data Communications
☐	☐	04. Communications Processors
☐	☐	05. Comm./Networks Software
☐	☐	06. Digital Switching Equipment
☐	☐	07. Facsimile
☐	☐	08. Modems
☐	☐	09. Multiplexers
☐	☐	10. Protocol Converters
☐	☐	11. Network Mgmt. & Control
☐	☐	12. Test Equipment
☐	☐	13. 3270 Controllers
		Telecommunications
☐	☐	14. PBXs
☐	☐	15. Key Systems
☐	☐	16. Central Office Equipment
☐	☐	17. Integrated Voice/Data Terminals

A	B	*Product/Services*
		Transmission/Network Services Equipment
☐	☐	18. Microwave
☐	☐	19. Satellite Earth Stations
☐	☐	20. Local Area Networks
☐	☐	21. Wide Area Networks
☐	☐	22. Packet Switching Equipment
☐	☐	23. Fiber Optic Equipment
		Communications Services
☐	☐	24. Packet Switching Services
☐	☐	25. Cellular Mobile Radio Services
☐	☐	26. Electronic Mail
☐	☐	27. Enhanced Services
☐	☐	28. Centrex

7 Estimated value of communications systems, equipment and services:
A. which you helped specify, recommend or approve in *last* 12 months? Check only ONE in column A.
B. which you plan to specify, recommend or approve in *next* 12 months? Check only ONE in column B.

A	B		A	B	
☐	☐	1. Over 10 million	☐	☐	6. $100,000-250,000
☐	☐	2. $5-10 million	☐	☐	7. $50,000-100,000
☐	☐	3. $1-5 million	☐	☐	8. Under 50,000
☐	☐	4. $500,000-1 million	☐	☐	9. Don't know
☐	☐	5. $250,000-500,000			

8 Estimated gross annual revenues for your entire company/institution:
Circle only ONE.
1. Over $1 billion
2. $100 million to $1 billion
3. $5 million to $100 million
4. Under $5 million

9 Estimated number of total employees at this location:
Circle only ONE.
1. Over 5,000
2. 1,000-4,999
3. 500-999
4. 250-499
5. 100-249
6. 50-99
7. 20-49
8. 1-19

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System/36 from **page 2**

has more than 70 IBM System/36s in locations throughout the country. Each hour, an IBM mainframe sends the System/36s order-processing information. Local processing functions are completed by the System/36s, and data is then sent back to the host over a leased-line network.

McKesson, a beta site for the System/36 more than three years ago, is pleased with the machine's capabilities. However, the company does not use any of the office automation tools currently available for it.

In the last few years, IBM has attempted to position the System/36 as an office automation departmental processor and as a gateway between IBM microcomputers and mainframes. But analysts are quick to point to the machine's numerous office automation deficiencies. The system has been critized for having weak office automation software, supplying only loose integration with other IBM systems and possessing insufficient processing power.

The software shortcoming lies in the fact that IBM has merely ported existing software to the IBM System/36, rather than designing software specifically for that machine, according to Andria Rossi, president of Rossi Consulting, a Marblehead, Mass., office automation consulting firm. Rossi claimed the System/36's data base management system, decision support system, electronic mail package and word processing package are not as powerful as those from competitors such as Digital Equipment Corp., Data General Corp. and Wang Laboratories, Inc.

Another problem is that the System/36 applications are not tightly integrated with those running on other IBM processors. For example, the IBM System/36 runs a version of IBM's Displaywrite word processing package that has different features and functions than those of the IBM Personal Computer version of the product.

Also, moving from a Personal Computer application to a System/36 application creates problems because users have to work with different interfaces, said Joel Levy, vice-president at Amy D. Wohl & Associates, a Bala Cynwyd, Pa. consulting firm. Levy claimed competitors have ported their software to IBM processors and supply a more consistent interface across IBM's line than Big Blue does.

Some analysts claim the IBM System/36 does not have sufficient processing power to perform as a departmental processor. Apparently in response to that shortcoming, IBM in January upped the number of users the system could support, as well as its internal and external storage capacity.

Despite the enhancements, some analysts remain skeptical about the machine's processing capabilities. "The System/36 was never designed for office automation," Levy said. He suggested that IBM try to position another piece of hardware, such as a low-end IBM 4300 series mainframe, in the office automation market.

Rossi disagreed. "IBM hasn't yet designed any software to take advantage of the System/36 hardware," Rossi said. "But the company keeps taking steps to improve the system's performance. I think that by next year, IBM will have made enough enhancements to the machine so that it can supply sufficient functions to make it a suitable office automation system."

Letters:

Editor:

Although the article, "Alaska users reject data base network" [*Network World*, April 7], generally reflects the situation here, there are some misleading implications. To begin with, [Software AG's] Adanet is not installed in Alaska. It would be a serious mistake to judge the merits of Adanet on the basis of the Adabas/Vtam software installed. Also, Alaska's unsuccessful experience with a distributed data base network is not the fault of Adabas/Vtam. If our data bases were subject-oriented, rather than application system-oriented, I feel there would be a greater potential for networking them.

Finally, the article leads the reader to believe that data base networking is a major priority for the state of Alaska. It is not. Most of our users are not aware or concerned about the issue. Distributed data base networking is a concept that has come before its time in Alaska. I fear that if we remove the Adabas/Vtam software as a cost-saving measure, a real need for it will surface.

Ralph Wesser
Data base administrator
Department of Administration
State of Alaska

Editor's note:

According to Software AG Chairman John Maguire, the state of Alaska had implemented portions of the as-yet-unreleased Adanet system. An important missing portion of the full Adanet system — as noted in the article — is the dictionary intended to maintain information on, among other things, physical data locations. Adabas/Vtam was not cited as the cause of problems with Alaska's distributed data base experiment. Highlighted on the basis of comments from Mr. Wesser and others involved were network-spawned response time delays, inefficient data requests, absence of data-base synchronization facilities, the lack of an appropriate application and tepid user response.

MCI from **page 4**

posed rate cuts are approved by the FCC. The savings do not include the $105,000 sign-up fee AT&T charges all users, regardless of the number of locations supported.

The tariffed version of Vnet includes a discount schedule that was not part of the original service release, according to Montgomery. Discounts increase with minutes of usage and range from 3.5% for 500,000 to 999,000 minutes of use to 7% for six million or more minutes of use, according to Knight.

Vnet options include: Customer Information Management, a data base users can access to create, review or revise customer-specific data; and Direct Termination Overflow, which enables customers to assign specific calls to specific trunk groups in the event that the customer's private branch exchange ports are busy.

Although some customer calls may be carried over digital facilities within MCI's network, as with competing services, Vnet does not allow customers to specify use of digital links. This limits use of the service for data to maximum standard dial-up analog transmission rates, typically 9.6K bit/sec.

First quarter from **page 4**

procedures. That accounting change, which was also instituted this quarter by IBM and other industry enterprises, came at a very convenient time with AT&T Chairman and Chief Executive Officer Charles Brown's last annual meeting, said Robert Morris, securities analyst with Montgomery Securities in San Francisco.

"Since it had to be done anyway, AT&T figured it might as well make the most of it," Morris said. Brown, who presided over the firm's recent annual meeting in San Francisco [*Network World*, April 21], is scheduled to retire in July.

Morris said regulated telephone business performed well, measured by growth in access lines and minutes of long-distance use. Those factors, he added, suggest that underlying businesses will continue to be strong. Morris said access lines, in general, increased by about 2.5%, and that long-distance revenue was up, in spite of a lack of price-increase activity during the quarter.

Nonregulated businesses, including customer premises, central office and transmission equipment, proved by their financial results to be very competitive, with margins extremely small, if they exist at all, Morris said. He added that part of the sluggishness in the customer premises equipment markets is attributable to corporate capital spending.

According to Jack Grubman, an analyst with New York-based Paine Webber and a former AT&T employee, first quarter results for the RBOCs "were only slightly less boring than those of the independent telephone companies." Grubman said the RBOCs performed as well as expected, but that AT&T could provide some interesting news in the near future. There's a lot of confusion at AT&T over what it will do in the computer area, he said. Grubman was referring to speculation that AT&T may acquire additional computer-related business.

Grubman singled out Timeplex, Inc. and M/A-Com, Inc., noting that although both companies reported negative financial results, each had positioned itself in an industry nich that should experience rapid growth this year. Timeplex has claimed its territory in the T-1 multiplexing market, while M/A-Com is a player in the private-networking market.

"There's a lot of hype around it, but the T-1 market will grow pretty spectacularly this year because of a very simple reason," Grubman said. "The transmission costs of DS1 signals are dirt cheap, and a corporation can easily justify spending $30,000 to $50,000 on multiplexers because the payback is so quick. Timeplex and NET [Network Equipment Technologies] are about the only two companies actually shipping product out the door." Grubman said M/A-Com would do something significant this year, in line with the company's recent announcement that it would spin off certain of its telecommunications-related businesses.

Pacific Telesis Group, Nynex Corp. and Bell Atlantic Corp. were singled out by most analysts as having performed better than average, while only the Denver-based US West, Inc. and St. Louis-based Southwestern Bell Corp. reported drops in first quarter earnings. "Pacific Telesis was up almost 20%, in spite of issuing seven million new shares. Nynex was up 13% and Bell Atlantic was up 10%," Morris said. "They showed decent earnings growth and very good cash flow. The RBOC's quality of earnings so far has been far superior to AT&T's."

The RBOCs, with the exception of Southwestern Bell and the Chicago-based Ameritech, have announced two-for-one stock splits, with the most recent announcement coming last week from Bell Atlantic. Analysts said the companies are attempting to improve the liquidity of their stock.

Morris noted that the RBOCs have been trading "only a couple hundred thousand shares a day. When a block of a thousand shares goes by, the price will go down 50 cents, which is just ridiculous."

Corrections

The cost of Nynex Corp.'s new Liberty Call service, which passes access charges on to users, was incorrectly reported in the April 14 issue. The service costs $.0568 per minute in New York and $.0434 per minute in New England.

The April 7 article, "Users seek solidarity," incorrectly listed the address of the International Communications Association's headquarters. The correct address is 12750 Merit Drive, Suite 710, LB-89, Dallas, Texas 75251.

Leasing from **page 22**
computer leasing firms. The added financing competition will keep lease rates down, stimulate an aftermarket for AT&T products and stabilize residual values. AT&T Credit also provides the sense of security that customers are looking for in financing telecommunications equipment.

AT&T is not alone in its efforts to seed a secondary market for telecommunications equipment. Northern Telecom, Inc., Rolm Corp. and many other major suppliers recognize the importance of a strong secondary market in building a loyal installed base in a market where product differentiation continues to decline.

In an industry facing increased commodity market pressures, pricing can be the key factor for users selecting a vendor. The low initial capital investment and flexible financing arrangements offered by the leasing community represent an increasingly attractive option.

Like the computer leasing market in its early stages, the telecommunications leasing market still awaits the development of a stable secondary market. If the market for used telecommunications equipment fails to grow, leasing companies will be unable to generate the investment capital necessary to finance leasing deals for new equipment acquisition.

Residual values of equipment are crucial to lessors. Without a vibrant secondary market for used equipment, these values will collapse. Residual values are determined to a large extent by the rate of technological change in the industry. Rapid change can make equipment obsolete and therefore worthless in both the primary and secondary markets.

Manufacturers' service and maintenance policies are also important to the secondary market. If the original equipment manufacturer refuses to support its old products, the secondary market for that equipment will disappear.

These market developments are important to users of telecommunications equipment because of the additional options they present for budgeting for system acquisitions. Users that are not in need of leading-edge equipment can find low-cost alternatives in the secondary market.

They should, however, carefully assess the level of vendor support for equipment acquired through the secondary market.

Bell from **page 7**
cess. Bolger noted that the company does not expect to have to raise rates until the latter half of 1987.

Neil Yelsey, an analyst with Salomon Bros. in New York said, "Bell Atlantic has done a good job of increasing productivity and diversifying into new lines of business but it is not the fastest growing or most profitable BOC." At last week's meeting, Bolger said Bell Atlantic had moved into a "leadership position within the industry."

BellSouth enjoys the highest level of profitability of all the BOCs. BellSouth and Pacific Bell have the highest rate of access line growth and will continue to hold that position, according to analysts.

Bell Atlantic has experienced the greatest increase in profitability of the BOCs during the past year, according to John Bartlett, a partner in the Washington, D.C. law firm of Wiley and Rein. "The stock market has responded more favorably to Bell Atlantic than the other BOCs lately," Bartlett added.

According to Yelsey, Bell Atlantic has been among the most active in its efforts to diversify. "Bell Atlantic feels that its diversification efforts could help accelerate growth in the future," he said.

Bartlett concurred. "It has been very aggressive in buying retail and service organizations."

Despite diversification, Bell Atlantic's mainstay remains its Network Services Companies, comprised of New Jersey Bell, Bell of

See **Bell** page 35

Attention Communication Executives:

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- Coverage of regulatory issues and how they will impact business communications. (Network World's Washington bureau is right on top of everything that's happening, and our editors see it from the user's point of view.)

Bell from **page 34**
Pennsylvania, Diamond State Telephone and the Chesapeake & Potomac Telephone Companies.

Bell Atlantic invested more than $2 billion in its network through the deployment of 61,000 kilometers of fiber-optic cable and installation of digital access lines last year. Bell Atlantic serves more than 15 million access lines and installed its millionth digital access line last November.

Said Bolger, "Network modernization helped pave the way for a number of value-adding technologies that will provide Bell Atlantic's customers with a wider range of services. Such services include common channel signaling, expanded 800-service, automatic calling card service and customer control over incoming calls."

Bolger credited the firm's "revitalization of Centrex" as a source of growth. The firm reduced Centrex prices by 25% to 30% last year, introduced multiyear contract options, cost and system control capabilities and installed central office-based local-area networking capabilities as part of its moves to beef up Centrex services.

Robots from **page 6**
MAP networks.

Thorvaldsson said 60 Asea robots in GM's Bowling Green, Ky., Corvette manufacturing plant will be connected to the plant's broadband net via Asea's MAP interfaces. He claimed the facility will be the first true MAP installation in production.

Robert McGoff, a member of Kuka's controls engineering group, said the company will announce a MAP-compatible interface device in June.

"With a MAP network," he explained, "a person can control all the plant's robots from a single desk. Without [a MAP network], that person would have to walk right up to each individual robot to see if it is working."

Systems can be hard wired

John Klein, IBM's manufacturing systems products general manager, said the company's recently announced manufacturing systems [see the IPC Expo story, *Network World*, April 14] can be hard-wired to the company's cell controller. IBM's 7532 Industrial Computer Model 310 is capable of controlling both the IBM 7575 and IBM 7576 Manufacturing Systems. Klein also said the two manufacturing systems could be connected to MAP networks, if necessary, using MAP interface boards.

Michael Kula, corporate engineering director for Haworth, Inc. in Holland, Mich., explained that his company uses robots to aid in the manufacturing of a variety of office products. "It is quite evident that the trend with robots is to connect them to networks," said Kula, who moderated a panel on management issues concerning the use of robots.

Gain working knowledge

Ray Hinson, director of Advanced Manufacturing Systems, Inc.'s (AMS) Manufacturing Technology Institute, advised prospective robot users to attain a working knowledge of current robot technology first. AMS is a systems integration firm that constructs turnkey manufacturing systems.

Hinson said prospective users believe robots can be easily implemented in manufacturing facilities. That view, he warned, is incorrect.

"Once the user has gained control of his manufacturing operations, installing robots is easy. If a user tries to install robots without first establishing order in factory operations, the effort won't succeed."

Hinson asserted many factory network users mistakenly believe robots can serve as a quick and easy answer to underproductive or poorly designed manufacturing systems. He claimed users often target inefficient areas of their manufacturing operations when readying for the implementation of robots.

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Calendar

April 29, New York — Paradox. Also, May 15 and 29, New York. Contact: PC Etc., 450 Seventh Ave., Suite 809, New York, N.Y. 10123.

April 30-May 1, Durham, N.C. — Southeastern Telecom Expo '86. Contact: Jan Doutre, GTE Supply, Lakeside Plaza 2, 5225 Wiley Post Way, Salt Lake City, Utah 27704.

May 6, Boston — Data Communications Seminar: The Dial-Up Network & Applications. Also, May 20, Philadelphia, Pa.; May 22, New York; June 3, Pittsburgh, Pa.; June 5, Detroit. Contact: Seminar Coordinator, Microcom, Inc., 1400A Providence Highway, Norwood, Mass. 02062.

May 6, New York — Framework II. Also, June 5, New York. Contact: PC Etc., 450 Seventh Ave., Suite 809, New York, N.Y. 10123.

May 8-9, Washington, D.C. — The Wireless Future: Marketing Cellular and Other Wireless Technologies. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

May 13-16, Madison, Wis. — Teleconferencing 86. Contact: University of Wisconsin-Extension, Registrations, 702 Langdon St., Madison, Wis. 53706.

May 14, New York — Lotus 1A to 2.0. Also, May 29, New York; June 11 and 26, New York. Contact: PC Etc., 450 Seventh Ave., New York, N.Y. 10123.

May 14-15, Washington, D.C. — Data Communications: The Fundamentals of Network Design. Also, July 8-9, Toronto. Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

May 15-16, Washington, D.C. — Computer III: Establishing A Regulatory Framework. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

May 19-21, New York — Managing Telecommunications for Better Service & Reduced Cost. Contact: American Management Association, 135 W. 50th St., New York, N.Y. 10020.

May 19-21, Denver — Information Everywhere: Building the Industry Here & Abroad. Contact: Information Industry Association, 555 New Jersey Ave. N.W., Washington, D.C. 20001.

May 19-22, Philadelphia — 1986 SME International Tool & Manufacturing Engineering Conference and Exposition. Contact: Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, Mich. 48121.

May 21-22, San Francisco — Federal ADP & Telecommunications Procurement. Also, June 3-4, St. Louis, Mo.; Sept. 3-4, Washington, D.C.; Nov. 18-19, Los Angeles. Contact: Marji Clark, International Data Corp., Washington Division, Suite 240, 1500 Planning Research Dr., McLean, Va. 22102-5096.

May 21-23, Amsterdam — World Teleport Association's Second General Assembly. Contact: World Teleport Association, One World Trade Center, Suite 63SW, New York, N.Y. 10048.

May 28-30, San Diego — SNA: Concepts, Design and Implementation. Also, June 18-20, Arlington, Va.; July 9-11, Scottsdale, Ariz.; July 30-Aug. 1, Palo Alto, Calif.; August 20-22, Boston. Contact: Center for Advanced Professional Education, 1820 E. Garry St., Suite 110, Santa Ana, Calif. 92705.

June 3-4, Washington, D.C. — New Light on Fiber Optics: Supply & Demand Heat Up. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

June 5, New York — Multimate Introduction. Also, June 19 and 25, New York. Contact: PC Etc., 450 Seventh Ave., Suite 809, New York, N.Y. 10023

June 12-13, St. Louis — Data Communications and Networking for the IBM PC XT/AT and Other Compatibles. Also, July 10-11, Baltimore, Md.; July 24-25, Hartford, Conn.; July 28-29, New York; August 11-12, Boston; August 18-19, Chicago. Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

June 16-17, Raleigh, N.C. — The IBM PC XT/AT: Maximizing its Potential. Also, June 26-27, New Brunswick, N.J.; July 21-22, San Diego; July 23-24, Denver; July 31-Aug. 1, Washington, D.C. Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

June 19-20, Las Vegas — IBM Futures—A 1990 Outlook. Contact: Gartner Group, Inc., 72 Cummings Point Road, Stamford, Conn. 06902.

July 8-10, Baltimore, Md. — Hands-On Data Communications: An Advanced Approach. Also, July 14-16, Las Vegas; July 21-23, Sacramento, Calif.; July 21-23, Chicago. Contact: The American Institute, Inc., Carnegie Bldg., 55 Main St., Madison, N.J. 07940.

July 9-11, New York — Fourth Annual PC Expo. Contact: PC Expo, 333 Sylvan Ave., Englewood Cliffs, N.J. 07632.

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This is a sampl... ...our classified advertising section. This is a sampling of our classified advertising section. This is a sampling of our classified advertising section. This is a sampling of our classified advertising section. This is a sampling of our classified advertising section. This is a sampling of our classified advertising section. This is a sampling of our classified advertising section.

3 Columns x 3 Inches

DATA COMMUNICATIONS MANAGER

If you are an aggressive self... ...rter who enjoys challenge, we ma... ...he position for you.

At least three... ...al involvement wit... ...ommunications supp... ...ooting is needed.

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2 Columns x 4 Inches

MANAGER CORPOR... INFOR...

Position is ...developing ar... ...external inforar... ...that focus on t... ...ments.

T... ...g of our classified pl... ...tion. This is a sample classified advertising sect...

1 Column x 2 Inches

DIRECTOR NETWOR... PLANN...

The qualified can... undergraduate ...g with gradua... ...preferred. A ... ...anagement in... ...switching and ... ...trong background... ...ing.

... our classified ad... ...his is a sampling of o... ...dvertising section. This is a ... of our classified advertising se... ...This is a sampling of our classified advertising section.

1 Column x 2 Inches

Manager, Technology Projects - Networks

Seeking experienced manager. The successful candidate will manage a staff of 15 technical professionals as well as provide overall direction on the telecommunications activities associated with our technology center.

You should have 5 ...years experience in telecomm... ...s networking, including ... ...e and data. Strong proje... ...gement abilities and prover... ...al skills.

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2 Columns x 6

TELECOMMUNICATIONS MANAGER

Responsible for engineering analysis of telephone utilities and issues. Requires engineering degree and two years of experience.

Responsible for engineering analysis of telephone utilities and issues. R... ...uires engineering degree and two years ...erience.

Responsible for engi... ...sis of telephone utilities and ... engineering degree and ... ...erience.

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2 Columns x 5 1/2

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HORRELLSCOPES

BY EDWARD HORRELL

In communications today, it takes more than just good business sense to survive; it requires celestial guidance.

Gemini: Two famous heads are rolling.

MCI Communications Corp. is dropping comedienne Joan Rivers and actor Burt Lancaster from its advertising campaign. MCI Chairman Bill McGowan said MCI plans to hit rival AT&T more with marketing and service differences than with the galaxies separating their rates.

It's nice to see less emphasis on the stars and more on what's important in the business.

Virgo: The virginal sign of the fussy maiden is for Digital Equipment Corp.

It's past the time for DEC to choose a mate.

The number-two computer maker in the country has got to merge with or acquire a major telephone maker or distributor to stay alive.

After all, the most valuable space today is on top of the executive desk, not in the back computer room. And the best way to rocket to the desk is through the telephone system.

AT&T and DEC have been star-crossed lovers more than once, but they never seemed to make a go of it.

It couldn't be DEC's fault. This company is very well respected from both product and management standpoints. So DEC shouldn't have to moon over AT&T. There are other eligible suitors. For example, how about Northern Telecom? Now there's a good-looking private branch exchange company any manager would be proud to bring home to its board of directors.

Such a romance would produce one big market player to rival the IBM and Rolm combination.

Scorpio: The sting comes to PBX users via multiyear maintenance contracts.

Users of PBXs think they're buying some kind of protection against astronomical service charges. But what they often fail to realize is that many of these contracts can be canceled by either party with little notice.

This means that it's possible for the vendor to cancel the contract, then offer to take the user back at a higher rate. It's not the best way to win friends and influence customers, but it's been done by some big stars — ask Rolm.

Users should be sure that the maintenance contract is cancelable only by them.

Sagittarius: Sears Roebuck & Co., under the sign of the hunter, is after a killing in the small telephone system game.

Sears, that famous telecommunications company that also sells garden rakes, paint, toys, women's skirts, men's drawers and children's shorts, is going to service small businesses.

And while there's no magic in telecommunications, the communications requirements of small businesses are critical. They deserve more than can be obtained through a catalog.

If this isn't a cosmic catastrophe, it should be.

Capricorn: The B.Y.O.B. idea is getting users' goats.

Users forced to piece together services formerly provided by Ma Bell are not pleased with the results of being their own Bell.

Informal Horrellscopes surveys have shown that users unanimously feel their costs are up, service is down and life is generally tougher for them.

Users at lectures, seminars and briefings across the country report they've had to hire additional employees, buy new software and hardware, institute new methods of diagnostics and maintenance on their equipment and do other things they were not prepared to do.

It doesn't take a talented stargazer to see meteorites shooting down on users.

Some time in the next year, a major company's network is going to crash. That will start businesses all over the planet shaking.

And then there will be nowhere under heaven for U.S. District Court Judge Harold Greene (of AT&T breakup fame) to find safety from the wrath of users.

Cosmic catastrophe of the month.

Equal access is the process set in motion by the Federal Communications Commission by which telephone users are asked to select a long-distance carrier.

Once the decision is made, the user informs the local telephone company and can access any long-distance carrier without wearing out a personal digit.

Nice idea.

Terrible results.

AT&T competitors expected big market shares that didn't appear. There was a lot of confusion among users, particularly among residential customers. Ballots were lost. Ballots were programmed incorrectly. Confusion still reigns.

There must be a better way to introduce competition into the marketplace and still provide equal service to providers.

Pisces: There's something fishy about many problems with newly installed high-tech systems.

A common, large and growing problem with new systems of all types in the high-tech world of telephone systems, minis, micros and local-area networks and so on is inadequate user training.

This training is provided by the vendor, and the best that can be said for most of it is that it stinks like a week-old fish.

It's probably going to get worse, since many vendors are beginning to charge extra for training and many penny-wise, pound-foolish companies will cut back on training to save money.

Executives who fail to learn how to use their new systems will feel victimized by the tools they are supposed to master. And nothing in the universe is as hard to deal with as an executive frustrated by a mere telephone.

Before buying any high-tech system in the future, users should be careful to spell out what kind of training their personnel will receive, what aids will be used in the training and who will foot the bill.

Leo: The Centrex lion needs to be unleashed.

Regulators need to turn loose the Centrex idea suggested by the Bell operating companies.

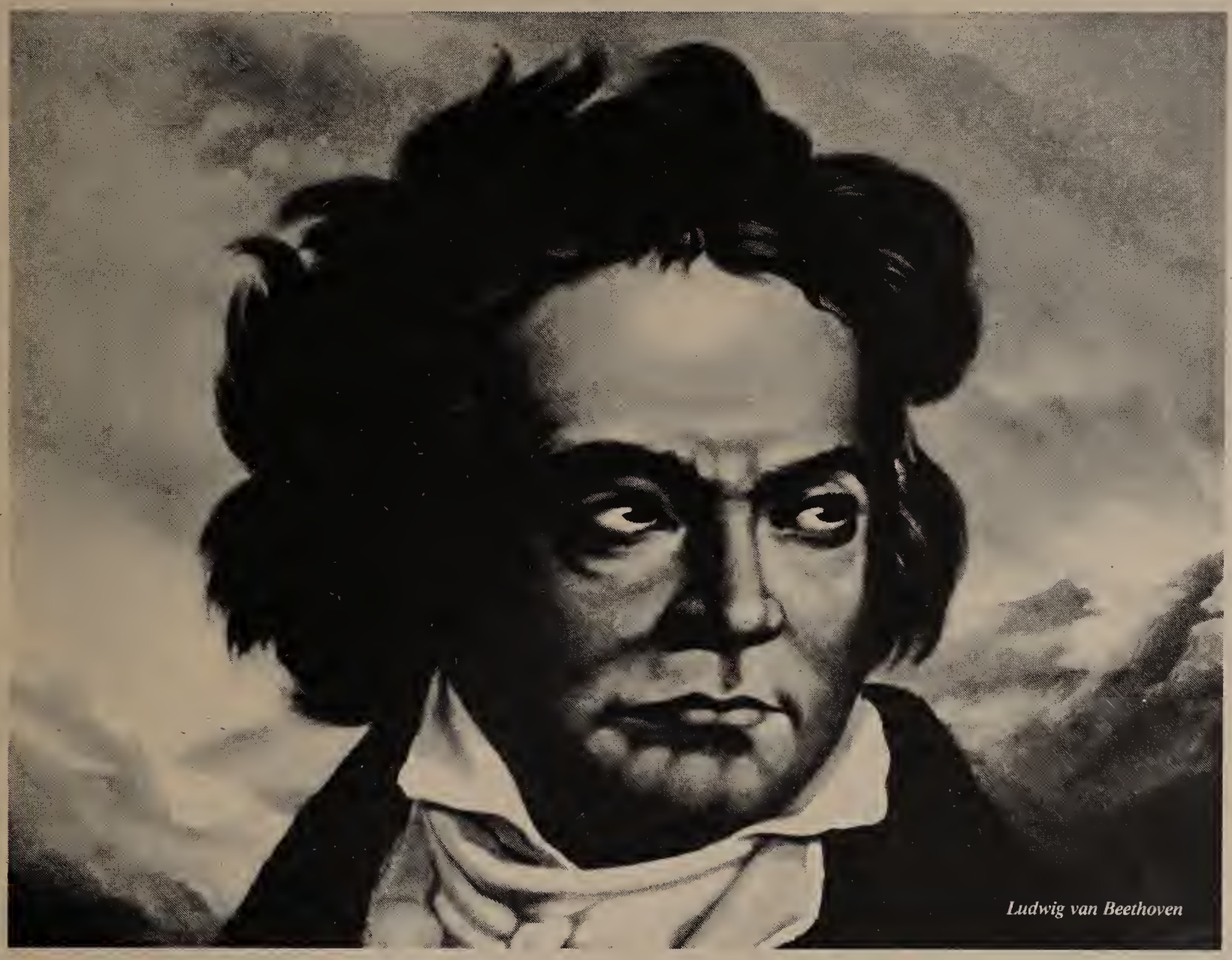
The BOCs are roaring about what great things large businesses can do with a powerful central computer that stores messages and has value-added network capabilities.

Whether they're right or wrong remains to be seen. It's too cloudy to forecast.

But the BOCs have the interconnects scared to death. These companies claim that it's already a jungle out there and they don't need another big animal to contend with.

Truth is, it's a survival-of-the-fittest world, and if Centrex eats up some marginal companies, well, that's what free enterprise is all about.

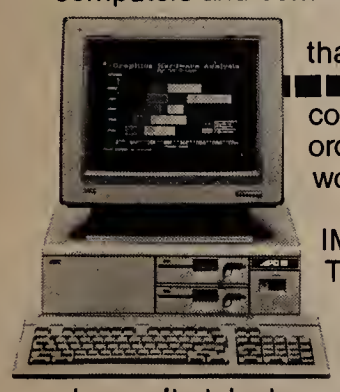
"Bring all the parts together in magnificent harmony."



Ludwig van Beethoven

THE HEART OF C&C: Beethoven described it 190 years ago.

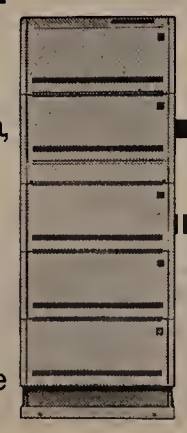
When you listen to Beethoven, you can hear the harmony at the heart of the concept that NEC calls C&C, for the integration of computers and communications.

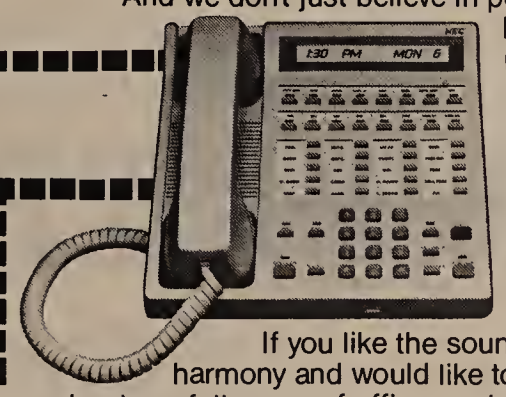


Because at NEC we have always known that managing information takes more than computers or communications alone. To orchestrate the modern office, you need both, working together as a unified whole.

That's why our remarkable NEAX 2400 IMS is more than a powerful digital PBX. This total Information Management System can take an office full of diverse systems and turn them into a joyful chorus. Its talents embrace not only voice, but data, text and image as well. On any scale you need.

Linked up with a NEAX 2400, our APC and ASTRA Series computers aren't just superb business machines. They're perfectly matched to our D[term] digital telephones. Our BIT Series fax terminals, cellular mobile telephones and teleconference systems can also be easily integrated with NEAX 2400. In networks with fiber optic, microwave or satellite transmission links.





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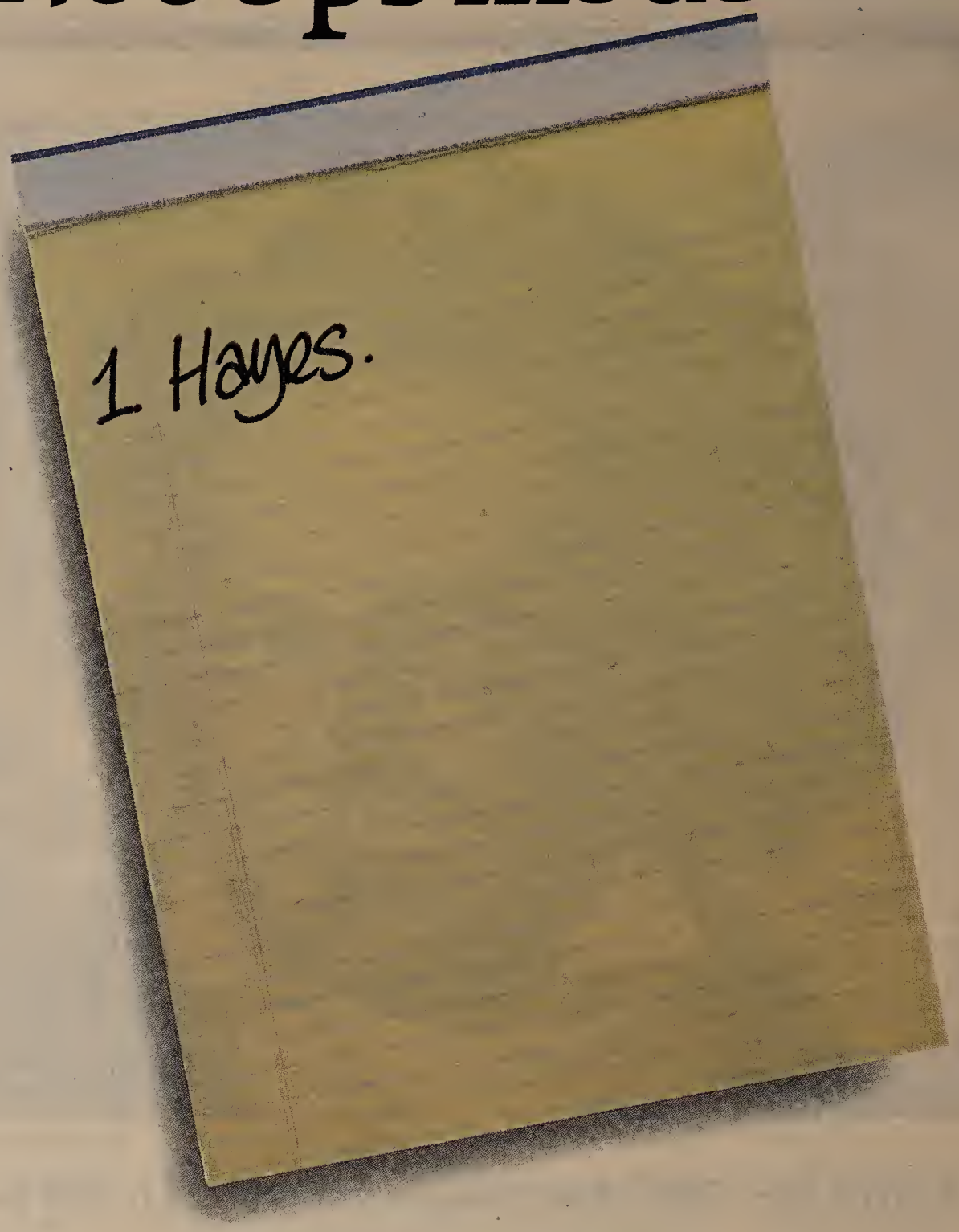
A complete list of things to know about 2400 bps modems.



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